APR. 7 1961

PETROLEUM WEEK

A McGRAW-HILL PUBLICATION

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Shrewd planning can help cut drilling costs 28

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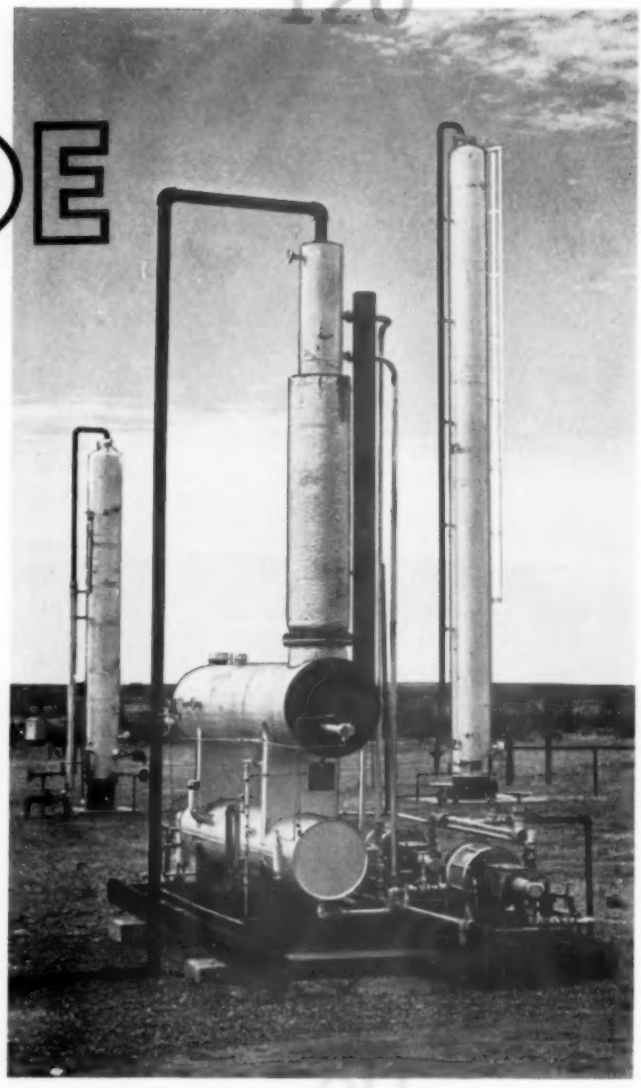

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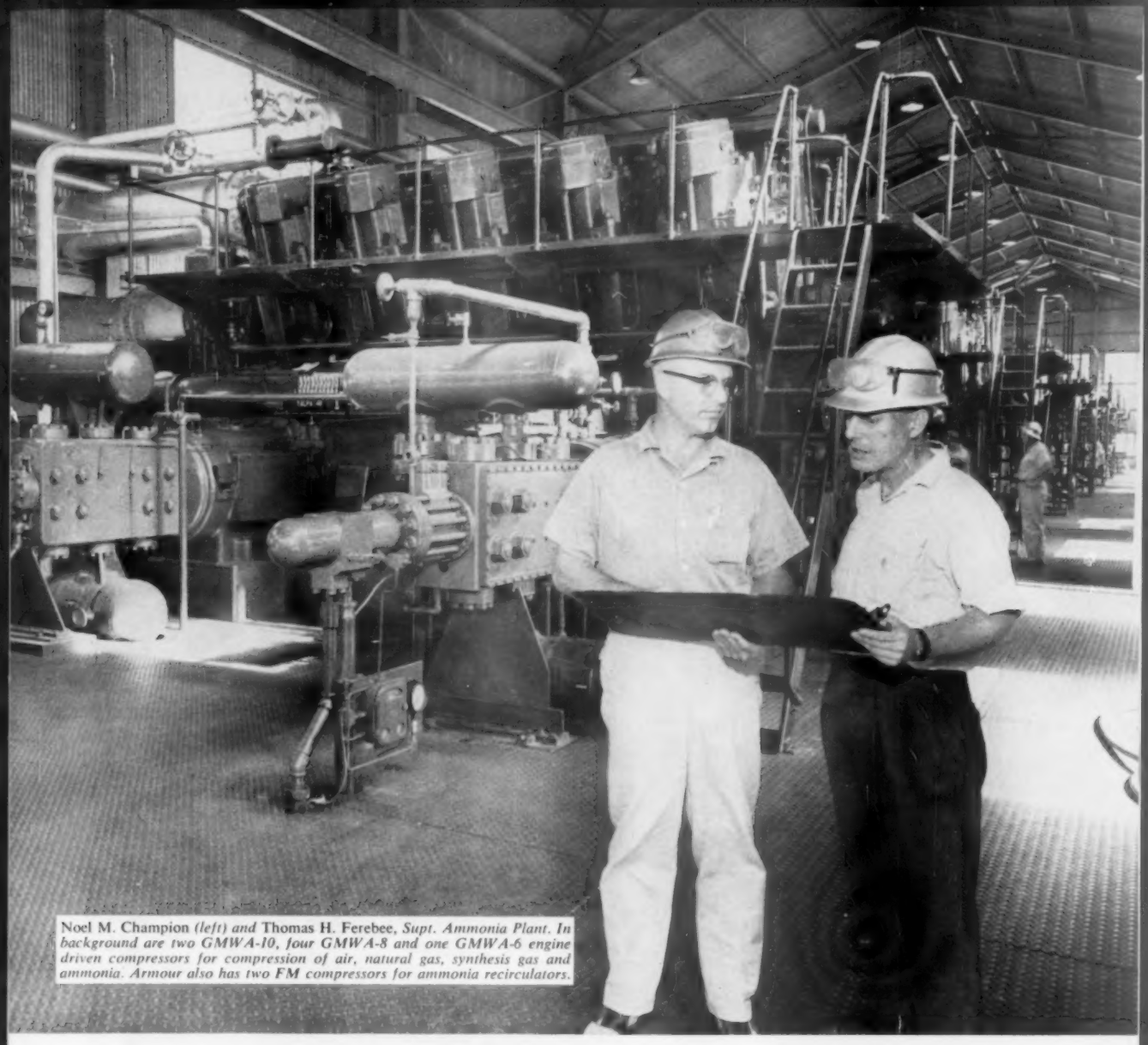

Noel M. Champion *(left) and* Thomas H. Ferebee, *Supt. Ammonia Plant. In background are two GMWA-10, four GMWA-8 and one GMWA-6 engine driven compressors for compression of air, natural gas, synthesis gas and ammonia. Armour also has two FM compressors for ammonia recirculators.*

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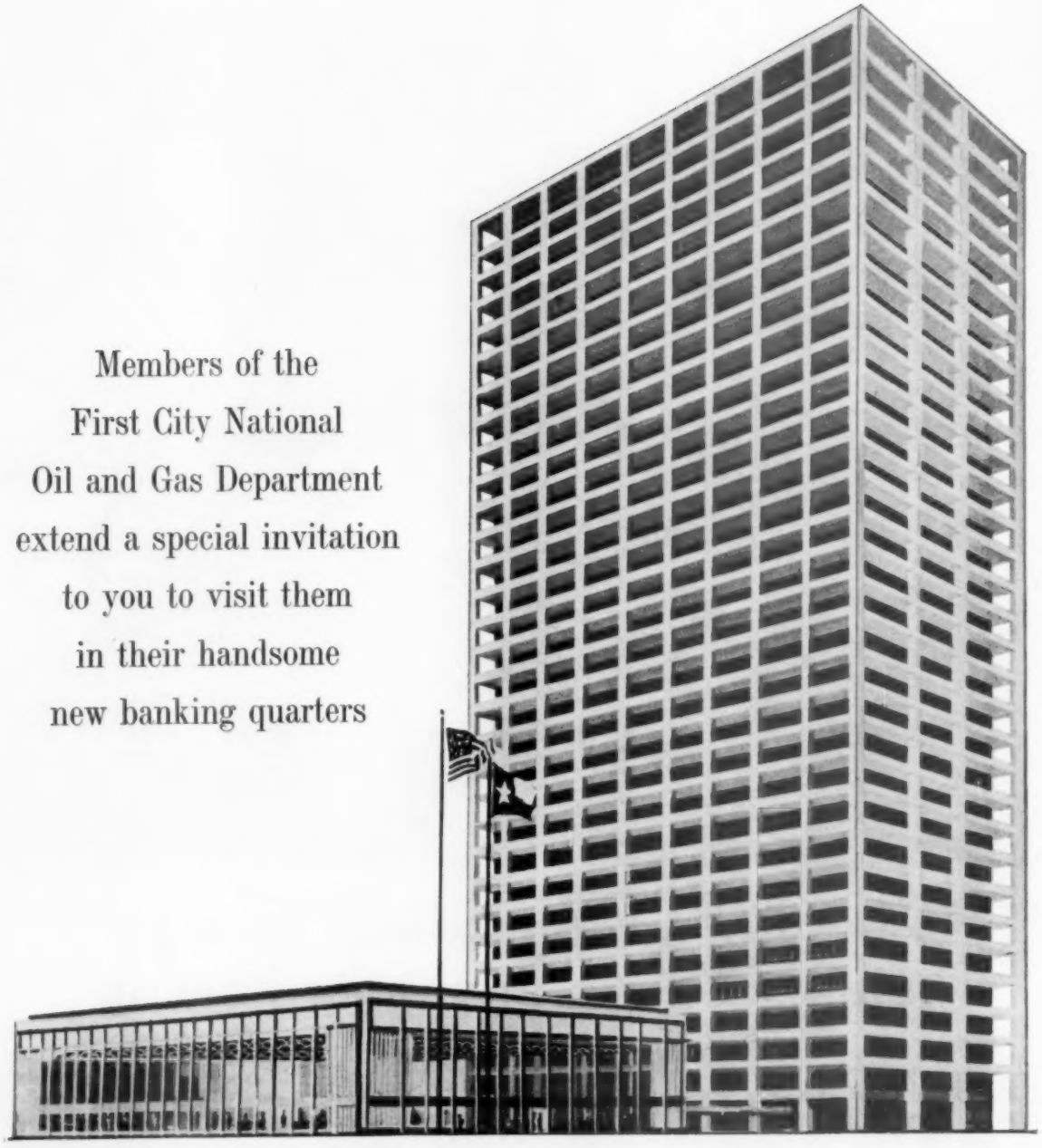

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INSIDE Slant

FOOD FOR THOUGHT

Why does the petroleum industry lag so in solving its problems?

That question was asked recently in a speech by Gov. J. Howard Edmondson of Oklahoma. At the same time, he said the solution to attract attention in the problem fields is "so simple as to be frightening."

To explain, he said:

"The oil industry should, through the great media at their hands—advertising—go to the people of the nation, in a way they have learned to accept. They are today aware and proud of their steel industry—the Bell Telephone Co.—the dairy industry—the automobile industry—I could go on and on.

"Why? They have constantly given the facts.

"When wages go up, steel goes up. The people accept it because they understand it. But if oil follows suit, as it must in such cases, we get a congressional investigation—because it is a mystery—this thing called oil."

The governor suggested that 5% of the companies' advertising budget should be placed in a pool that would give the industry an institutional program second to none in the nation.

LeRoy Menzing
Editor

Congrats and $25 for this quip to J. P. Denny, Phillips Petroleum Company, Box 1351, Odessa, Texas

Oil and gas men are quick to say that Lone Star products are "tough, top quality and delivered fast". Quick supply, and superior steel are among the reasons more and more have switched to Lone Star API casing, tubing and line pipe.

Exacting quality control combined with years-ahead manufacturing techniques today . . . are your guarantee of API standards in Lone Star pipe. And remember, delivery in the field is a matter of hours.

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Views That

Resid Controls Opposed

Dear Sir:

I was pleased with the editorial "Too Much Time Wasted on Resid Imports" [PW—Mar.17'61,p56]. You have heard me argue in the past several years at Import Control Committee meetings that controls on resid were not important to the domestic producer; their enforcement is complicated and the producers' support of a continuation of resid import controls aggravates the situation in the northeastern states at a time when oil needs more friends.

MASTON NIXON
Director-consultant
Southern Minerals Corp.

Stick-in-the-Muds?

"Someone has said that petroleum marketing hasn't changed much in 30 years. This may be proof of our stability, but certainly it is no tribute to our imagination."

—REXFORD S. BLAZER
Chairman
Ashland Oil & Refining Co.

Exploration's Pitfalls

"More and better technology will not solve exploration's present economic troubles, but will aggravate the situation because of increased costs. Today's excellent exploration technology is not only adequate for present and foreseeable needs, but is far superior to domestic exploration's ability to use it intelligently. What is needed are better and more economic ways of using modern oil-finding tools and methods, so that costly excess, waste, duplication, misuse, misdirection, and confusion are eliminated."

—D. M. E. MCLARTY
Petroleum consultant
Denver

A Surplus to Draw On

"The decline of student interest in the drilling and producing phases of the oil industry is a direct consequence of pessimistic opinions as to the 'dire straits' of the oil industry. These are generally based on the current availability of an excess supply of oil and gas.

"It is quite true that the world has oil productive capacity greater than its demand. What industry doesn't have this situation? Certainly the automobile manufacturers can produce more

Make News

cars than they now manufacture . . . It is this surplus capacity which we rely on in times of emergency, just as the head of a family uses his savings in times of distress."

—Dr. Carl Gatlin
Chairman, engineering department
University of Texas

How Not to Succeed

"I have yet to see a man make his way to the upper levels by conforming to any precast or prefabricated mold. I have seen many fail by following such a course. And I have seen far more fail by pursuing conventional approaches than I have ever seen fail by ignoring them."

—Crawford H. Greenewalt
President
Du Pont Co.

Oil in a Straitjacket

"In spite of the confusion compounded by numerous astounding court decisions, Congress gives no indications that remedial [natural gas] legislation will come along in the near future. Indeed, the petroleum industry may find itself in the incredible position of fighting to maintain the Natural Gas Act as it stands today, rather than be subjected to more severe regulation by amendments, to the act, which could put the entire petroleum industry in a straitjacket."

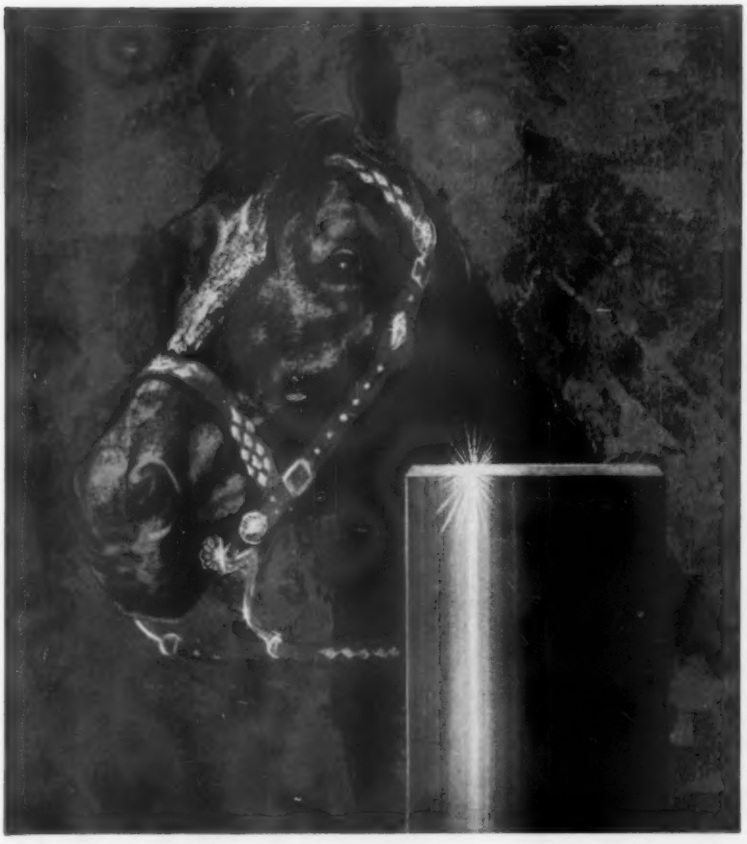
—Charles E. Webber
Director, natural gas administration
Sun Oil Co.

Circus Schemes

"Today's sophisticated public will no longer buy the Barnum and Bailey schemes dreamed up by yesterday's press agents. People in industry today find that their messages to the public must not only be sincere and true, but must show a primary benefit to the people and the community as well."

—George H. Priggen, Jr.
General manager
Kansas City division
Mobil Oil Co.

Petroleum Week *will publish reader comments each week. Address letters to LeRoy Menzing, Editor,* Petroleum Week, *330 W. 42nd St., New York 36, N. Y.*



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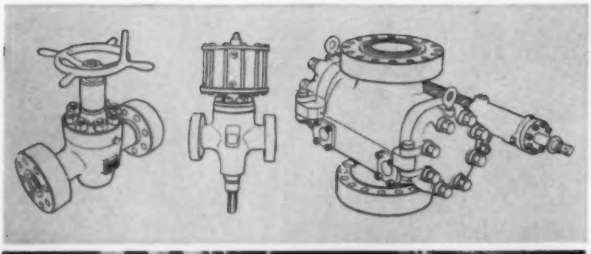

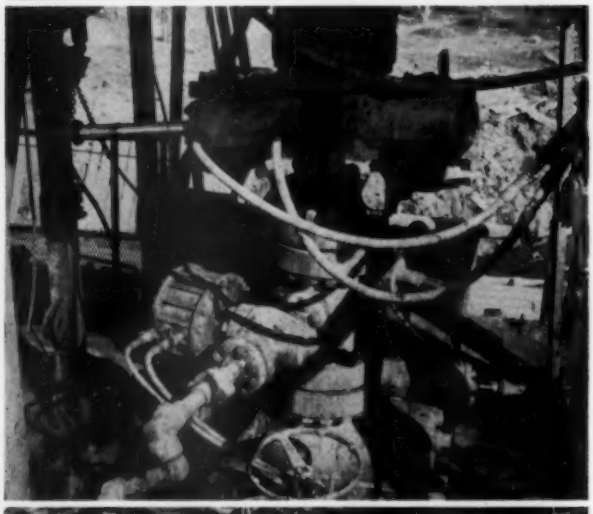

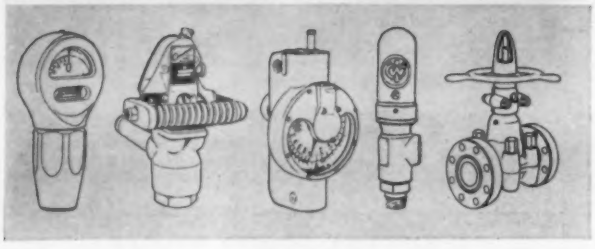

Cameron introduced the first successful blowout preventer to the industry over 40 years ago. Since then, the control of pressures during drilling and workover operations has been our constant concern. The Type "F" Blowout Preventer is a product of our years of experience and continuing research and is now the standard of comparison for the majority of successful operators throughout the world.

Available in sizes 6" (7-1/16" bore) through 20" (20-1/4" bore) and in working pressure ratings to 15,000 PSI, Cameron Type "F" Blowout Preventers can be the most important part of your rig.

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Although blowout preventers are the central building blocks of your drilling control hookup, remember that all lines connected to it deserve equally careful attention. Cameron Gate Valves with their exclusive rotating seats are setting new records in long, trouble-free service on drilling control manifolds. These valves are available in sizes 2" to 6" and in working pressures to 15,000 PSI.

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For complete drilling control go Cameron all the way.

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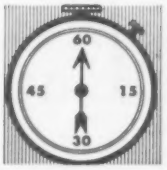
60-Second Summary



THE WEEK'S MOST IMPORTANT DEVELOPMENTS

PETROLEUM WEEK

April 7, 1961

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Top oil men feel that first-quarter earnings will be good—but that refinery runs and gasoline demand will have much to do with the first-half picture. . . . p. 16

•

Processors, particularly those in the petrochemical field, are waxing enthusiastic about a new technique called evolutionary operation. It's a method of optimizing production without disturbing operations. . . . p. 48

•

In-place sales of natural gas are stirring up much interest among transmission companies and federal regulators. It's an approach whereby pipeline firms buy out a producer's reserves. The Federal Power Commission is going to give such sales a closer look in the future. . . . p. 13

•

An electro-thermal "drill" may enable oil men to conduct better seismic operations in arctic areas covered by snow and ice. Developed for the U.S. Army, it is being tested in Greenland. . . . p. 26

•

Much of the mystery has been torn away from "cleavage fracture," a phenomenon whereby pipe rips open at high velocity. An American Gas Assn. research group now feels that ways can be devised to prevent such ruptures. . . . p. 36

•

There are still many areas where drilling costs can be cut, says Warren L. Baker, of the American Assn. of Oilwell Drilling Contractors. Failure to achieve such economies can lead to "undesirable repercussions," he adds, for both contractors and operators. . . . p. 28

•

The superstation may be the basis of American Oil Co.'s nationwide marketing plan. The company is expanding the concept, which has been confined to a few test cities. . . . p. 55

•

Cost-of-service is still the key issue in the Federal Power Commission proceedings on area pricing. And the commission, in the face of many protests, has eased its ban on "indefinite" pricing clauses. . . . p. 14

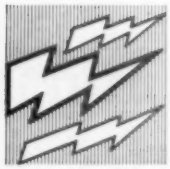
•

The hunt for nonpetroleum minerals is proving beneficial to some contractors in western states. One interesting offshoot is the development of "upside-down" drilling. . . . p. 24

•

Colombia has passed a stiff oil law that removes the 50% limit on the government's tax take. It will hike costs sharply for present concessions and new grants. . . . p. 41

Up to the Minute



SIGNIFICANT LATE NEWS

PETROLEUM WEEK

April 7, 1961

At least 38 wells producing 1,000 b/d in California's Wilmington field were damaged this week by a deep-seated earthquake. The quake, estimated to have occurred approximately 10 mi. below the surface, caused slippage just about 2,500 ft. in the field. Union Pacific R.R. Co. reported 23 oil wells were off production and one water-injection hole was damaged. Ten wells owned by the Port of Long Beach and four by Atlantic Oil Co. also stopped producing. The damage was in fault blocks 1, 2, and 3.

•

Distillate prices were trimmed 0.25¢ a gal. in the Gulf Coast spot cargo market this week, the second such reduction since mid-March. The cut lowered the No. 2 "low" price to 9¢ a gal., 1¢ higher than the year-ago level. The reduction in the primary market came as suppliers in the East started their summer-fill discount programs.

•

Domestic refinery runs declined last week to an average of 7,855,000 b/d, the lowest rate since Dec. 2. It was the fourth successive reduction, trimming runs for the last week of March 619,000 b/d below the record high set at the start of the month. Runs for the first quarter averaged 8,166,000 b/d, up 1% over last year. Total demand in the first quarter averaged 10,682,000 b/d, down 1.1% (page 53).

•

Continental Oil Co. and Ohio Oil Co. will join Ambassador Oil Corp.'s exploration venture in the Republic of Ireland, subject to government approval. Ambassador's exclusive exploration right covers the entire nation, including offshore waters.

•

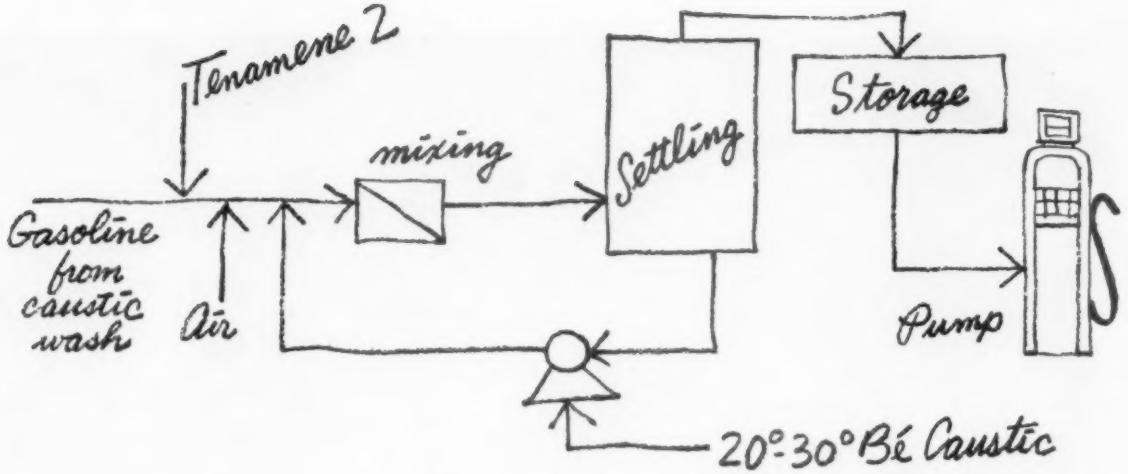
Socony Mobil Oil Co. will spend $350-million this year for capital and exploration outlays, an increase of 9.4% over 1960. Slightly more than half has been budgeted for world-wide exploration and producing activities. More than one-fifth will be spent on marketing facilities. Three-fifths of the total will be spent in the U.S. and Canada.

•

John M. Kelly, who was sworn in this week as Assistant Secretary of Interior for Mineral Resources, will oversee the oil import program. Oil Import Administrator Lawrence J. O'Connor, who will be retained in his post by the Kennedy Administration, was formerly a special assistant to the Interior Secretary and reported direct to him.

•

The Federal Power Commission at midweek ruled out the use of cost-of-service methods in setting area prices for gas. The commission upheld the arguments of Texaco Seaboard, Inc., and a group of Permian Basin producers, who asked that cost of service be excluded (page 14). General industry costs—drilling costs, for example—will be considered.



For gasoline stocks that respond, the economy and simplicity of Tenamene 2 inhibitor sweetening can seldom be equalled by any other treating method

In the presence of caustic and oxygen, Tenamene 2 catalyzes the conversion of mercaptans to disulfides. Being insoluble in caustic, it remains in the gasoline stream to effectively inhibit the formation of gum in the finished gasoline. Thus, it both sweetens and inhibits in essentially one operation.

Tenamene 2 inhibitor sweetening is primarily of interest to processors of catalytically-cracked gasoline. The response of such gasolines to the inhibitor sweetening method can be quickly determined by the following test:

1. Using sour gasoline from the primary caustic scrubber or mercaptan removal unit, put 700 ml. into each of several one-quart bottles.
2. To one group of samples, add Tenamene 2 at a rate of 5 pounds/1,000 bbls. (14.25 mg./liter). To another, add 10 pounds/1,000 bbls. (28.52 mg./liter).
3. Add 10 vol. % of 15° Baumé caustic to each sample.
4. Stopper the bottles, shake thoroughly. Replace stoppers with notched corks and store samples in a dark place at room temperature.
5. Examine at 3-hour intervals and determine the time required for sweetening.

If the results of this test indicate Tenamene 2 inhibitor sweetening to be effective in treating your sour gasoline, we will be glad to aid you in making a detailed study of your sweetening and stabilization requirements. In this study we will help you determine the optimum processing values for your particular operation, including inhibitor concentration, caustic strength and proportion, acid oil content, process temperature and reaction time. For an evaluation sample of Tenamene 2 and more information on the Tenamene 2 inhibitor sweetening method, write or call your Eastman representative, or write to Eastman Chemical Products, Inc., subsidiary of Eastman Kodak Company, Kingsport, Tennessee.

Basic Procedure for Tenamene 2 Inhibitor Sweetening
(see sketch)

The sour gasoline is washed with 10-15° Baumé caustic. Between 5 and 15 pounds of Tenamene 2 is added per 1000 barrels of hydrocarbon. A small quantity of air is injected into the stream and the gasoline contacted with 20°-30° Baumé caustic. The gasoline is allowed to settle, then pumped to storage. If not already sweet when it goes to storage, the gasoline should sweeten within a few hours after storage.

Tenamene 2 inhibitor sweetening is, in almost every instance, more economical than doctor or copper chloride sweetening. Unlike doctor treating, no regeneration step is necessary, and there is no reduction in tetraethyl lead response. Unlike copper chloride treating, Tenamene 2 inhibitor sweetening does not allow the possibility of gum-catalyzing, copper contamination.

Most refineries find that minor modification of existing procedures enables them to adopt this method.

Tenamene 2
an Eastman gasoline additive

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Survey party sets out in the all-wheel-drive Scout: Plenty of room for both crew and working gear! All steel Travel-Top (optional) makes pickup box weather-tight. The Scout strips down—cab top, windows, doors come off in minutes. Less than 13 ft. overall on a 100-in. wheelbase, only 68 in. wide and 68 in. high. Powered by new COMANCHE 4-cyl. 90 hp engine.

Shot hole drill-rig crew follows up: They get the job done with the rugged INTERNATIONAL model RF-190 six-wheeler. This rig can drill through bedrock, taking poundings that literally lift it off the ground. Heavy, varying or surging loads are all in a day's work for the truck-built clutch and transmission.

Explosive and sound-recording crew moves in: INTERNATIONAL model B-160 is versatile enough to haul the explosives, yet solid enough to carry and care for the delicate instruments in the recording cab. Whether standard V-8 or optional Six, the engines are all *truck-designed.*

Explore Anywhere with this geophysical team

Now, with the new Scout® by INTERNATIONAL, you have a transportation team that's...

Mobile: It's rough running a string of holes, but this gutsy INTERNATIONAL team can't be stopped by any terrain!

Powerful: Best power-to-weight ratios yet engineered – for delivering fast drilling power to promising ground!

Enduring: They stay on the job, stand up to full throttle—even when drilling through bedrock!

Put this proven INTERNATIONAL truck team to work with your crews! And remember, INTERNATIONAL equipment is backed by sales and service centers across the country, plus 12 major parts depots. This means less "downtime"—resulting in doodle-bugging days that are faster-striking and less costly.

INTERNATIONAL® TRUCKS IH®

WORLD'S MOST COMPLETE LINE

International Harvester Company, Chicago

Number 4 of a Series
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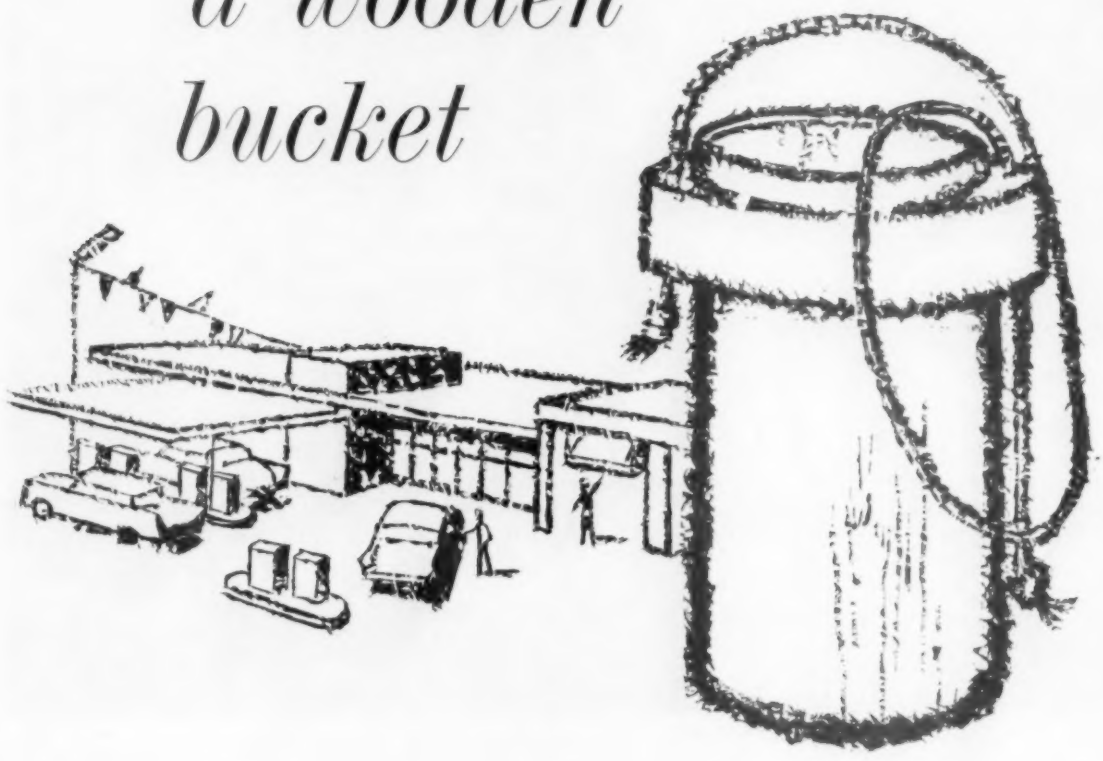
It started with a wooden bucket



A long the early rutted trails of Pennsylvania rolled the Conestoga wagons with a wooden tar-bucket slung from the rear axle. Teamsters swabbed smoking hubs with a mixture of tar and lard, or with petroleum seepage when they could find it. That tar-bucket is the ancestor of the service stations that today pump 42 billion gallons of motor fuels into passenger cars and trucks each year.

This necessity is taxed more than most luxuries; Federal and state taxes add nearly 50% to the price of gasoline. The petroleum industry has developed better fuels at lower actual cost, but taxes have eliminated any benefit to the consumer. Since 1925, *taxes* on gasoline have increased 380%. The average price of gasoline (not including taxes) has increased *only 1%* during the same period. No other industry has made so many product improvements with so small an increase in actual cost during this period of declining dollar purchasing power.

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Regulators Eye Gas Reserve Sales

Federal Power Commission staff officials promise a closer look at the recent rise of in-place purchases by interstate transmission firms. Producers are generally reluctant to make such sales, but with the continued uncertainty over field pricing, the advantages may outweigh the disadvantages.

The interstate natural gas industry, accustomed to uncertainty, is curious about the possibilities of an unusually stable type of gas deal, the in-place sale.

Under an in-place sale, a gas transmission firm simply buys out a producer's reserve, instead of entering a contract to buy his production.

The in-place sale has been used for transactions within producing states, but is relatively rare in interstate commerce.

Texas Eastern Transmission Corp. pioneered with the first major in-place sale for interstate use, but Tennessee Gas Transmission Co. has since entered the field in a big way, with three transactions adding up to 2-trillion cu. ft. of gas.

These are the principal sales to date:

- **Rayne Field:** Texas Eastern, after having made conventional contracts with Continental Oil Co., M. H. Marr, Sun Oil Co., and General Crude Oil Co., then agreed to pay $134.4-million for the leases, said to hold nearly 1-trillion cu. ft. of gas.
- **MCN:** Tennessee Gas bought offshore Louisiana leases from MCN (Mobil Oil Co., Continental Oil Co., and Newmont Oil Co.) for $68.3-million for 475-billion cu. ft. of gas and 6.6-million bbl. of liquid hydrocarbons.
- **Bastian Bay:** TGT has agreed to pay Pan American Petroleum Co. $159.4-million for more than 1-trillion cu. ft. of gas and 2.6-million bbl. of liquids.
- **Ship Shoal:** The CATC Group (Continental Oil Co., Atlantic Refining Co., Tidewater Oil Co., and Cities Service Petroleum Co.) have agreed to sell Tennessee Gas, for $97.3-million, leases estimated to contain 533-billion cu. ft. of gas and 16-million bbl. of liquids.

Transmission company spokesmen are most enthusiastic about the interest in in-place sales, and they agree that only extreme frustration with federal regulation could induce the major producers to enter them.

They also say that only very large packages of gas in new fields are likely to be sold in place.

With the continued uncertainty over producer regulation, however, producer and consumer representatives also feel that in-place sales hold some advantages for everyone, and could have, in the words of one, "a very big place in the future."

The four big packages of gas sold in place have been in southern Louisiana, where some of the largest uncommitted reserves have been available in recent years, and where wellhead prices are the most uncertain.

This uncertainty over pricing stems from the U.S. Supreme Court's CATC decision.

The original CATC case is still before a Federal Power Commission hearing examiner, and several sales authorized by the commission at the original CATC price (22.4¢ per Mcf., including tax) have been reversed by courts.

FPC has set an area price ceiling for southern Louisiana at the CATC level, but the possibility that consumer interests may succeed in rolling back prices there has left a cloud over most transactions in the area.

Some pipeline company sources doubt, therefore, whether producers would enter in-place agreements if FPC succeeds in working out an area-pricing scheme that simplifies federal regulation, and is flexible enough to assure producers an adequate price in the event of continued inflation.

By agreeing to a single price for his reserves, and accepting payments in installments over 16 or 17 years, the producer leaves himself wide open to the effects of inflation.

Producers who have made in-place deals seem to be betting that field prices have bumped a ceiling, imposed either by FPC or by competitive conditions.

What they may lose through general inflation, therefore, is the price they are willing to pay to avoid the delays and complexity of federal regulation.

Pipeline companies and their distributor customers gain the benefits of price stability for the life of the reserves, and the advantage of flexibility that comes to a pipeline with its own production.

A pipeline with its own production is in a position to use this gas for peak demand periods, and use its contracted gas, frequently bought under take-or-pay-for provisions, as the basis of its normal daily supply.

The Federal Power Commission and the courts thus far have given in-place sales a fairly hearty reception. But unresolved questions remain.

The Rayne field deal has become the test case. It got full endorsement from FPC, but the Court of Appeals for the District of Columbia wasn't entirely satisfied with FPC's approach, and sent it back.

The court agreed that FPC had full authority to approve the sale of the leases, but it said the commission went too far by implying its approval of the unit price of the gas without adequate evidence.

One industry lawyer remarked that the New York Public Service Commission, which appealed FPC's decision, "won the battle, but lost the war," because the court didn't insist on evidence of producer costs.

However, the court urged "most careful scrutiny" of the gas costs to a pipeline firm in in-place sales, because of the "interminable delay" in rate cases.

The commission staff has promised to give future in-place proposals a closer look.

Tennessee's MCN purchase is before the FPC staff, which intends to probe the reserve estimates thoroughly. The staff also will explore whether "prepayment" for gas—that is, full payment for the reserves by the purchaser some years before the

reserves are exhausted—is in the public interest.

"We learn a little more about these things all the time," one staff attorney says, "and there's still a lot we want to find out about the MCN case."

The commission has encouraged transmission companies to obtain their own reserves, however, and the possibility of completely stable gas costs without escalation fits FPC's objectives on price.

The Rayne field gas, for instance, was originally contracted for at 22.6¢ per Mcf. plus 1.3¢ per Mcf. tax. The cost to Texas Eastern of producing the gas works out to 20.59¢ per Mcf.

FPC, in its opinion, noted that this is 2.01¢ less than the producers originally asked, and might eventually work out to an even greater savings because of the possibility that more gas would be recovered than estimated.

Tennessee's case in behalf of its MCN purchase is based on an average price of 23.16¢ per Mcf. over the estimated 24-year life of the reserves. This, says TGT President Harold Burrow, "only slightly exceeds FPC's current area price, including tax reimbursement, of 22.79¢ per Mcf."

On the basis of the first day's hearing on the MCN deal, some dispute seems inevitable over reserve estimates when the hearings resume Apr. 17.

When TGT entered ordinary contracts with the three producers, reserves were estimated at 276-billion cu. ft. But total reserves in the leases is now put at 475-billion cu. ft., and the pipeline will be asked to show the reason for the increase.

Tennessee connected its Bastian Bay gas under a "budget-type" permit to build minor facilities, so FPC scrutiny of the cost of the gas probably won't come until the costs show up in a TGT rate case.

The Ship Shoal gas was bought without any condition involving approval by FPC.

Therefore regulatory policy on in-place sales will be determined in the Rayne field and MCN acquisitions.

Cost-of-Service Still Key Gas Issue

Significant moves in gas producer regulation are taking place at the Federal Power Commission and in Congress.

At FPC:

- Consumer interests have made it clear that the key issue in the area-price proceedings in the Permian Basin is still use of traditional cost-of-service methods.
- In response to a storm of protests from producers, the commission has eased its ban on "indefinite" pricing clauses to allow periodic redeterminations.
- The commission has also raised its ceilings in three Texas Railroad Commission districts to clear away more pending producer cases.

In Congress:

- Rep. Torbert H. MacDonald (D., Mass.), close friend of President Kennedy, has joined to other Commerce Committee Democrats to reintroduce legislation to exempt from regulation all gas producers who sell less than 2-billion cu. ft. of gas per year.

The next step in the Permian Basin gas pricing proceeding will be an FPC conference in Washington starting Apr. 12.

This was scheduled at the close of the preliminary conference in Midland, Tex., last month. The topic will be the kind of questionnaire needed from producers to develop information for setting area rates.

FPC staff members submitted a lenghty questionnaire, as a point to begin discussions, at the Midland hearing.

Small producers were most vehement in opposing this. They claimed it would be impossible for them to compile the extensive data requested.

For small producers, however, a compromise is being worked out with the cooperation of the commission staff. This would require them to file only an abbreviated questionnaire giving general information.

The commission was expected to rule on a motion to ban cost data in area pricing before the conference, but consumer intervenors have promised to take the cost issue to the courts.

Some 36 major producers, led by Texaco Seaboard, Inc., petitioned the full commission for a ruling specifically banning the use of traditional cost-of-service information to determine area rates.

The California intervenors—the City of San Diego, San Diego Gas & Electric Co., the City of Los Angeles, the Pacific Lighting companies, California, and its Public Utilities Commission—are leading the fight for cost-of-service.

They are backed up by a group of 22 distributors served by Northern Natural Gas Co., Wisconsin, and its Public Service Commission.

The basic contention of these interests is that a court of appeals decision in the City of Detroit case makes the use of costs, "at least as a point of departure," a legal necessity.

If FPC rules, in conformity with its Phillips decision of last fall, that it doesn't want to base area prices on cost-of-service, the consumer interests will fight to upset the ruling.

California advised the commission to make its ruling on the Texaco Seaboard motion a "final order," so that it can be appealed to the courts immediately.

If FPC rules out cost-of-service, and no appeal is allowed, the result would be "to cast doubt upon any proceedings had thereafter," California said.

A group of major producers is willing to go along with the collection of extensive cost information if FPC says it is needed.

The industry group has developed its own questionnaire, which, according to FPC staff members who have analyzed it, goes about as far in seeking cost information as the staff's own.

If the commission decides to take cost evidence, enough producers have agreed to submit it to get the formal hearings started.

The commission's ban on all but fixed price increases in producer contracts met such intense opposition for small and large producers that the order was modified.

The producers warned FPC that, by denying them the rights of pipelines to ask for increases, it was threatening future gas supplies by discouraging exploration and forcing producers to seek intrastate markets.

Pan American Petroleum Corp. predicted that, under the ban, producers would be forced to stay away from long-term contracts and make agreements for brief periods.

On indefinite pricing clauses, FPC eased its ban last week to allow redeterminations no oftener than every five years.

The redetermined price asked for could be no higher than prices already approved by the commission in the area.

One effect of the change, therefore, is to give each producer with redetermination clauses in his contracts the right to file every five years to take advantage of any increases in area prices.

Congress Urges Regulatory Reform

- **Both parties recommend longer terms for commissioners, more power for examiners to make final decisions.**
- **But the legislators will be reluctant to give Kennedy complete control over the regulatory bodies.**

Everyone concerned except President Kennedy has now had his say on what should be done to reform federal regulatory agencies such as the Federal Power Commission, Atomic Energy Commission, and Interstate Commerce Commission.

The latest report is from the Senate subcommittee on administrative practice and procedure, headed by Sen. John A. Carroll (D., Col.), and it comes complete with minority views from Sen. Everett Dirksen (R., Ill.).

These critiques are added to similar studies from Kennedy's special assistant on the agencies, James M. Landis, and from the House commerce committee, headed by Rep. Oren Harris (D., Ark.).

Kennedy will have an array of proposed reforms to choose from in preparing his report to Congress on the agencies. It is due later this spring.

Congress has eased Kennedy's role in making improvements by extending his power to reorganize the executive branch, a short-cut previously granted to Presidents Truman and Eisenhower.

Under this procedure, Kennedy can avoid the drawn-out legislative process, and recommend changes that become effective automatically within 60 days unless the House or Senate vetoes them.

A simple majority of the members of either house present and voting has the power to kill changes.

The latest report on regulatory agency reforms echoes earlier suggestions: longer terms for commissioners, more authority for hearing examiners, and the creation of a White House guidance office.

The latter proposal is likely to prove the most controversial.

House Commerce Chairman Harris has protested direct White House guidance of the agencies—first recommended by Landis—and Republican leaders in Congress have strongly criticized Kennedy's request for monthly reports from the agencies on their activities.

There will be bipartisan support for some of the proposals, but changes interpreted by Congress as weakening its control over the agencies will have opponents in both parties.

Democrat Carroll and Republican Dirksen, for example, disagree over the proper treatment for natural gas rate increases.

The Carroll majority report sharply objects to the piling up of rate increase cases at FPC, and claims that companies use the funds from increases, while the commission is examining them, at the expense of consumers.

The majority charges "padding of about 50% in requested rate increases."

The companies should be required to put the funds in escrow, the majority says, and the agencies should "make sure that any excess rate which is ultimately disallowed will be returned to the consumer, and does not benefit the utility."

Dirksen disagrees with these recommendations.

He agrees, however, with the majority opinion that hearing examiners should have more power to decide cases finally, leaving commissioners more time for policy making.

While Carroll would give commissioners limited power of review of examiners' decisions, Dirksen would prefer a new level in the agencies, above the examiners, for review purposes, thus confining commissoners strictly to policy-making.

Carroll backs criminal penalties for some types of off-the-record contact between agency officials and private parties, but Dirksen disagrees. Harris has backed criminal penalties for improper contacts.

Carroll would like to make agency positions more attractive by increasing terms to ten years, and hiking salaries and pensions. Dirksen thinks 15-year terms would be better.

Carroll would give a new President power to remove enough members of each agency to give his party a majority, but members thus displaced would get their salaries for the remainder of their ten-year terms.

Dirksen suggests giving the President veto power over agency policies, subject to the approval of a simple majority of Congress. This power would not extend to individual decisions.

Humble Starts Midkiff Flood

Humble Oil & Refining Co. has started waterflooding its 23,000-acre Midkiff unit in the Spraberry Trend, West Texas.

With initiation of the flood through ten injection wells, Humble assumed operation of 219 wells now producing approximately 55,000 bbl. of oil per month. The number of producing wells will be increased to 235.

The Midkiff unit is one of three approved for the Spraberry Trend. The other two are Sohio Petroleum Co.'s Driver unit and Southland Royalty Co.'s Aldwell unit (PW—Sep.2'60, p18). It's expected that another ten units will be set up within the trend. Preliminary work on these projects is in various stages.

The Humble project is aimed at recovering an additional 29-million bbl. of oil from the unit area.

This compares with 10.7-million bbl. of oil already recovered by the various operators (some 70 of them) within the unit. There are approximately 750 royalty interest owners.

Humble has estimated that ultimate primary recovery from the unit would have been around 530 bbl. per surface acre (based on Upper Spraberry reserves only), but that the waterflood will boost this to around 1,260 bbl. per surface acre.

The flood required three months of preparatory work.

Humble kept two rotary drilling rigs and several workover rigs busy during this interval. Eight of the ten injection wells were provided by converting existing depleted wells, and two were drilled. There will be 73 input wells when the unit is under full flood, in about a year. It's estimated that more than two years will pass before oil production of the whole unit is affected.

Two 288-hp. gas-powered centrifugal pumps are injecting approximately 10,000 b/d of salt water into the Spraberry.

The pumps are capable of delivering 78,000 b/d at an injection pressure of 300 psi., or 39,000 b/d at a pressure of 600 psi. Injection water is being obtained from the shallower Santa Rosa formation in the area.

How the 25 Leading Oil Companies Rank

(Asterisks indicate change in rank)

Company	Gross Income Rank '60	Gross Income Rank '59	Gross Income 1960 (Thousands)	Gross Income %Change '60-'59	Net Income Rank '60	Net Income Rank '59	Net Income 1960 (Thousands)	Net Income %Change '60-'59	Net Crude Production Rank '60	Net Crude Production Rank '59	Net Crude Production 1960 (b/d)	Net Crude Production %Change '60-'59	Refinery Runs Rank '60	Refinery Runs Rank '59	Refinery Runs 1960 (b/d)	Refinery Runs %Change '60-'59
Jersey Standard	1	1	$8,915,000	+ 2.3%	1	1	$689,000	+ 9.4%	1	1	2,193,000	+ 2.5%	1	1	2,871,000	+ 2.8%
Socony Mobil	2	2	3,646,000	+ 3.7	5	5	182,600	+11.3	5	5	712,000	+ 6.4	3	3	981,000	+ 4.5
Gulf	3	3	3,240,627	+ 1.2	3	3	330,311	+13.7	2	2	1,463,528	+12.2	5	5	759,152	+10.8
Texaco	4	4	3,140,805	+10.9	2	2	391,751	+10.6	3	3	1,234,423	+ 8.1	2	2	1,327,363	+ 7.8
California Std.	5*	6	2,053,042	+ 7.5	4	4	266,113	+ 4.9	4	4	928,301	+11.4	4	4	841,030	+ 6.4
Indiana Standard	6*	5	2,038,208	+ 2.9	6*	7	144,762	+ 3.7	7	7	318,994	+ 3.7	6	6	636,326	+ 6.4
Shell	7	7	1,838,483	+ 1.0	7*	6	144,588	— 1.9	6	6	320,000	+ 1.3	7	7	501,000	+ 2.2
Phillips	8*	9	1,228,636	+ 4.2	8	8	112,934	+ 7.9	10	10	178,139	+ 8.1	11*	10	229,984	— 3.0
Sinclair	9*	8	1,222,384	— 0.8	10	10	52,547	+16.7	9	9	182,785	+ 3.1	8	8	435,983	— 1.3
Cities Service	10	10	995,721	— 1.3	13	13	41,320	— 2.6	13	13	125,160	+ 0.3	9	9	266,292	— 4.9
Continental	11	11	799,145	+ 1.6	9	9	61,233	+ 1.6	8	8	185,675	+ 3.9	14	14	180,278	+ 0.7
Sun Oil	12	12	755,426	+ 1.2	11*	12	49,273	+15.0	12	12	149,937	+15.9	12*	11	225,290	— 3.0
Pure Oil	13	13	654,450	+ 5.3	18*	17	32,555	+12.6	20	20	75,986	+15.8	16	16	166,527	+ 0.1
Tidewater	14	14	583,150	+ 4.2	16*	15	35,063	+ 3.3	14	14	114,000	+ 0.9	10*	12	240,000	+ 5.7
Atlantic	15	15	561,205	+ 3.7	12*	16	46,566	+54.3	11	11	152,692	+10.9	13	13	193,017	— 0.9
Union	16	16	535,631	+ 4.4	17*	19	34,478	+25.3	16	16	95,443	+ 3.9	15	15	166,975	— 3.3
Sunray	17	17	463,769	+ 2.9	14*	11	41,121	— 6.1	18	18	79,527	+ 1.3	18*	17	148,145	— 3.8
Kentucky Standard	18	18	413,653	+ 1.7	25*	24	13,792	— 6.3	....	....	.....	.....	....	....	.....	.....
Ohio Standard	19	19	402,443	+ 1.5	21*	22	24,662	— 1.6	23	23	39,349	+ 1.0	20*	18	137,306	— 1.2
Richfield (L.A.)	20*	21	368,069	+ 7.6	19*	18	28,720	+ 2.4	19	19	76,607	+ 6.2	17*	19	148,331	+ 7.6
Ohio Oil	21*	20	357,778	+ 2.4	15*	14	39,215	+ 1.5	15	15	99,583	+ 1.7	21	21	100,066	— 0.2
Signal	22*	24	305,559	+57.3	23	23	16,509	+ 1.6	21*	22	85,000	+ 1.7	22	22	80,400	— 6.8
Ashland†	23*	22	303,673	+ 1.0	24*	25	14,927	+ 4.0	24	24	22,305	+38.5	19*	20	146,586	+ 7.3
Skelly	24*	23	254,926	— 1.1	22	20	24,415	— 9.3	22*	21	63,197	— 2.0	23	23	48,866	+ 0.2
Amerada	25	25	102,445	+ 0.1	20*	21	27,569	+ 6.9	17	17	80,879	— 5.3	....	....	.....	.....

† Fiscal year ended Sept 30.

Refinery Runs, Gasoline Use Will Set

First-quarter earnings will likely show that oil and the U.S. economy are still going in opposite directions. Oil's upturn late in 1960 will carry through the early part of 1961, contrary to the general business trend, top oil men say.

Oversupply and weak product prices resulted in shaky first and second quarters for oil companies last year. The over-all economy, by contrast, was relatively firm.

Paradoxically, when the nation's business slumped at midyear, prices for refined products recovered sharply as efforts were made to bring supply in line with demand.

Thus, oil firms in the second half bucked the setback in profits that was suffered by leading companies in steel, automobiles, chemicals, and electronics.

J. C. Donnell II, president of Ohio Oil Co., for one, expects the seesaw relationship between oil and general business to continue through the first half.

"There seems to be a consensus among economists that the nation is in some kind of readjustment, with no strong expectations of an upturn before midyear," he said.

"The petroleum industry, however, entering 1961 with an improved overall inventory position and higher refined products prices, should show earnings during the first half of 1961 substantially better than in the corresponding period last year."

In like vein, officials of Phillips Petroleum Co.—which had record earnings last year—commented: "We expect a further rise in earnings in 1961. Contributing to the improvement will be most of the factors effective in 1960.

"Prices for petroleum products recovered some in the last half of 1960. It appears that prices on the average will be higher in 1961."

Oil firms kicked off 1961 in a strong position. Many companies reported all-time-high earnings in 1960, with the top 25 companies scoring a combined increase of 8.3% in net revenues.

Besides Phillips, companies reporting record earnings included Gulf Oil Corp., Texaco Inc., and Continental Oil Co.

The improvement in Gulf's earnings over 1959 came entirely from operations in the U.S., the firm said.

Sun Oil Co. and Ashland Oil & Refining Co. had their second-best earnings in 1960.

At the end of 1961's first quarter, however, the industry was in the doldrums of top-heavy product inventories and generally weak prices.

Just how long such a condition will continue—and what impact the current market position will have on earnings for the first half—depends primarily on whether or not refinery runs are kept at levels commensurate with the normal downturn in demand.

Toward the end of March, domestic refinery runs were trimmed sharply. And as the second quarter opened, there were some signs of optimism in the wholesale markets. Discounts on gasoline prices are smaller than they've been in some months.

The market is not firm enough yet for significant price advances, but the heavy gasoline consuming season is at hand.

A rule of thumb is that the largest

30-Year Trend of Net Earnings

(In thousands of dollars)

	1930	1935	1940	1945	1950	1955	1959	1960
Jersey Standard	42,151	62,863	123,886	154,156	408,223	709,310	630,000	689,000
Texaco	15,073	17,065	31,548	51,857	149,072	262,730	354,346	391,751
Gulf	10,649	10,552	22,150	45,214	111,140	218,064	290,467	330,311
California Standard	37,675	18,594	22,488	55,555	150,804	231,139	253,599	266,113
Socony Mobil	40,246	22,526	36,409	41,494	128,217	207,434	163,952	182,600
Indiana Standard	46,371	29,979	33,597	50,340	123,581	157,118	139,597	144,762
Shell	5,096	6,813	15,655	28,797	90,121	139,549	147,418	144,588
Phillips	3,041	13,422	11,590	22,572	51,557	95,203	104,639	112,934
Continental	256	8,814	4,318	15,143	42,407	46,359	60,272	61,233
Sinclair	12,026	11,307	3,793	15,645	70,193	80,710	45,027	52,547
Sun Oil	7,745	7,100	7,969	15,667	36,291	48,307	42,844	49,273
Atlantic	2,743	3,971	6,219	1,509	40,842	39,464	30,174	46,566
Cities Service	*	5,856	9,928	15,061	56,659	49,307	42,434	41,320
Sunray	527	334	606	1,819	20,463	39,472	43,815	41,121
Ohio Oil	10,630	5,488	8,733	13,950	37,350	41,255	38,633	39,215
Tidewater	8,751	7,205	6,764	19,595	33,364	37,790	33,941	35,063
Union Oil	9,605	5,038	4,607	9,201	17,178	30,523	27,515	34,478
Pure Oil	6,540	8,150	8,718	13,582	30,329	35,164	28,905	32,555
Richfield (L.A.)	58	(2,161)	3,815	2,986	23,046	29,609	28,058	28,720
Amerada	3,961	1,798	1,776	5,397	15,400	25,364	25,787	27,569
Ohio Standard	3,724	2,691	6,209	3,713	20,221	23,008	25,061	24,662
Skelly	1,917	2,586	3,317	8,531	28,514	32,240	26,906	24,415
Signal	690	89	922	2,050	7,502	9,640	16,257	16,509
Ashland†	175	327	697	980	10,004	10,106	14,349	14,927
Kentucky Standard	5,253	2,198	3,818	3,530	12,072	12,677	14,726	13,792

* 1930 figure not comparable.
† Years 1945-1960 reported on fiscal-year basis, ended Sept. 30.

First-Half Earnings Trend

money-makers are the companies with a high degree of self-sufficiency in crude.

Atlantic Refining Co., now with a high ratio of crude output to refinery requirements, had a 54.3% increase in earnings last year. That was achieved with a gain of only 3.7% in gross.

Atlantic's nine-month earnings ran only 7.8% above the previous year.

Explaining his company's enviable record, Atlantic's president, Henderson Supplee, Jr., pointed out that Atlantic is a "different type of company than it was a decade ago."

Significant strengths have been built into the company, he said, outstanding among which is self-sufficiency.

To understand fully the important changes in the operating structure of the company, Supplee went on, it's necessary to look back to 1954 when the new program was put into effect.

At that time, he said, Atlantic produced only 56% of the crude required by its refineries. In 1960, Atlantic's own production supplied 79% of its refinery needs.

Although 1960 was a record earnings year for many firms, there were some casualties. A half-dozen companies reported decreases in net revenue.

In general, however, the dips in earnings were not as severe as a year ago.

Skelly Oil Co., whose earnings skidded 9.3%, pointed the finger of blame at curtailed production. Skelly and Amerada Petroleum Corp. were the only companies reporting a decrease in crude production during 1960.

Don H. Miller, Skelly president, noted: "With the company having the major portion of its production in severely prorated states, such as Texas, the forced reduction in crude oil production affected earnings."

Similarly, Sunray Mid-Continent Oil Co. said its slip of 6.1% in earnings was due primarily to "heavy proration of crude production by state regulatory bodies, and because of depressed product prices during the early part of the year."

Depressed prices and higher costs were cited by Standard Oil Co. (Ky.), Cities Service Co., Shell Oil Co., and Standard Oil Co. (Ohio), all of which had lower profits.

Cities Service also attributed its dip in profits to special charges connected to the elimination of its majority interest in Arkansas Fuel Oil Corp., and a substantial increase in the provision for taxes charged to income.

Creeping costs have frozen the gross-to-net ratio at 8% for the past three years or more.

Standard Oil Co. of California was again the best money-maker among the largest companies, carrying 13% of its gross to net.

The top-ranking company in gross, net, crude production, and refinery runs—Standard Oil Co. (N.J.)—had a gross income almost equal to the combined gross of the next three leading firms, Socony Mobil Oil Co., Gulf, and Texaco. Yet Jersey Standard carried only 7.7% of its net to gross, less than the average for the top 25 companies.

Socony, which ranks second in gross income and fifth in crude production, carried only 5% of its gross to net.

Gulf, which ranks third in gross income and second in crude production, netted 10.2% of its gross.

Texaco, fourth in gross and third in crude production, carried a hefty 12.5% of gross to net.

Signal Oil & Gas Co., which showed the largest gain in gross income—57.3%—netted only 5.4% of its gross, although it produces close to 81% of its refinery requirements of crude. In contrast to the large jump in gross income, earnings inched up only 1.6%.

A substantial portion of the increase in Signal's gross was due to a full year's operations of the companies it acquired in 1959—the former Bankline Oil Co. and Eastern States Petroleum & Chemical Corp.

One way that companies are attacking spiraling costs is by reducing the number of employees.

Cutbacks in company workforces are achieved by attrition, early retirements—or layoffs, if firms have no alternative.

Atlantic's Supplee reported to stockholders that, during 1960, "an intensive program to reduce the number of personnel was carried out to bring productivity to the point necessary to remain fully competitive.

Standard Oil Co. (Ind.) officials told a meeting of the Investment Analysts Society of Chicago that the company had reduced the number of employees by 10,300, or 20%, since 1956.

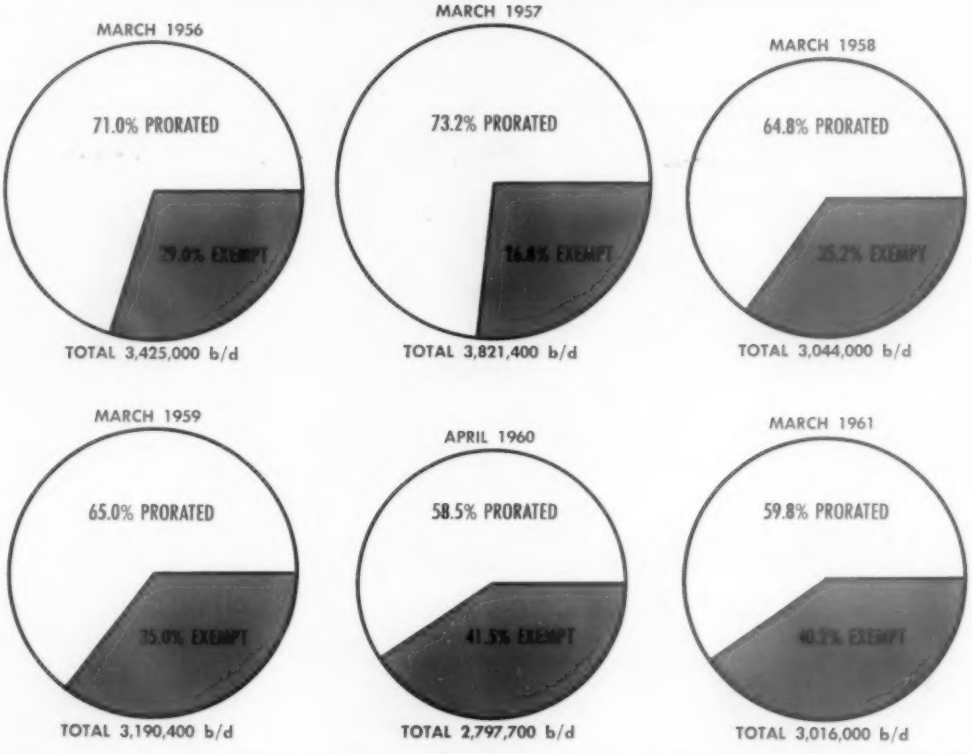
"Actual wage and benefit costs have been reduced $26-million since our

peak in 1957," one Indiana Standard executive said. "But had we not reduced our work force, our wage bill in 1960 would have been some $80-million higher than it actually was."

The industry-wide 5% wage increase granted in December will add to company headaches. It may boomerang on employees in that it will be met, in part, by new cutbacks in work force.

Indiana Standard officials have made this plain for their company: "We are starting 1961 with a 5% general wage increase, which adds about $17-million to our costs, but we expect to offset part of this by further reductions in work force."

Here's How Distribution of the Texas Average Calendar Day Allowable Shapes Up Over the Past Six Years



Texas Exempt Allowable Dips Slightly

The exempt allowable in Texas continues to take a sizable chunk of the state's average calendar-day allowable—40.18% in mid-March.

This represents a drop from the 45% registered at the end of last November, and a slight drop from a year ago, when the total was 41.45%. But the 1961 percentage amounts to a jump of 11 percentage points since March, 1956, when it totaled 29%.

The exempt allowable percentage dropped somewhat in March, 1957, to 26.8%, and then climbed to 35.2% in March, 1958, and levelled off to 35% in March, 1959.

The total exempt allowable in Texas now averages 1,211,975 b/d—down from a peak of 1,216,821 b/d at the end of last November.

A year ago, the exempt allowable, which includes marginal, discovery, and all other exempt wells not subject to shutdown days, averaged 1,159,737 b/d.

The total has been steadily climbing over the year: It was 993,375 b/d in March, 1956; 1,025,767 b/d in March, 1957; 1,070,824 b/d in March, 1958; and 1,116,885 b/d in March, 1959.

Texas now has 110,611 exempt wells with an average production of 10.96 b/d, and 87,640 prorated wells averaging 20.58 b/d.

Exempt wells included 50,342 marginal wells with allowables totaling 393,828 b/d; 1,404 wells under new pool allowables totaling 113,206 b/d; 167 "special" wells with particular producing problems, with 4,855 b/d allowable; and 58,698 wells with other exemptions and a 700,086 b/d allowable.

Allowables for marginal wells included in the over-all exempt have been steadily climbing to the current high of 393,828 b/d. In early April, last year, the total was 349,388 b/d. In March, 1956, it was only 144,946 b/d. It increased to 178,100 b/d in March, 1957, to 245,600 b/d in March, 1958, and 342,800 b/d in March, 1959.

Truckers Can Haul 'Bags'

The Interstate Commerce Comission has taken a middle-of-the-road stand on the who's and how's of using collapsible freight containers in shipping petroleum and petrochemical products.

For the past two years, a dispute has flared between general commodity truckers and bulk commodity haulers —principally tank truck operators— over which should have authority to transport goods in the newly developed containers.

These containers are usually made of rubber or corrosive-resistant aluminum (the latter stack like paper cups when empty). They can be filled with up to 4,000 gal. of liquids, and up to 18,000 lb. of dry, flowable solids, and hauled on flatbed, open top, or van-type truck trailers. When emptied, they collapse and can be easily stowed away.

The commission gave general commodity trucks permission to carry products in the collapsible containers, but attached several conditions.

It authorized the general commodity truckers to transport freight bags which are filled off the truck and then placed aboard the vehicle by forklift, crane, or otherwise. But it prohibited them from transporting premounted bags that are filled on the vehicle. Hauling in this instance will be the province of tank truckers and other bulk commodity haulers.

The "compromise" position drew a strong dissent from two of the eleven commissioners.

They said the decision's effect is to preclude general commodity carriers, who are most likely to promote use of the containers, from handling them in an efficient and economical manner, while tank truck carriers are not so restricted.

They pointed out that the bags can be filled faster and at less expense if left on the truck trailer. They said large shippers may be able to afford the special lift equipment that will be required when general freight truckers are used, but that small shippers won't, and that it remains to be seen how many general commodity truckers will provide the equipment themselves.

ICC prohibits general freight truckers from handling bulk commodities and those requiring special loading or handling techniques. But, they argued, this should not keep them from transporting the freight "bags" even though the containers accommodate only one commodity in bulk amounts.

They are permitted to haul bulk liquids and solids in packages, drums, or other containers, they pointed out, and they insisted that freight bags fall into this category.

They said it made no difference where the container is filled, and that filling the bag mounted on an ordinary trailer doesn't convert the trucker's operations to a specialized service.

Tank truckers took the opposite stand, arguing that the freight bag is really a cargo tank, and that its use on a motor vehicle makes the vehicle a tank truck.

Wagner to Head U.S. Chamber of Commerce

Richard Wagner, chairman and chief executive officer of Champlin Oil & Refining Co., will become president of the U.S. Chamber of Commerce on May 2. It is a one-year term.

The 64-year-old executive is known in business circles as an articulate advocate of tax reform and other measures that would produce more venture capital for economic growth.

He was a vice-president, and later president, of Chicago Corp., and converted that company into a diversified investment firm to finance a variety of industries. Chicago Corp. later concentrated on oil ventures, bought Champlin in 1954, and adopted its name.

Wagner is a director of the American Petroleum Institute and of Central Illinois Public Service Co. He is also former chairman of Tennessee Gas Transmission Co., Houston.

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GUIDE SHOE helps limit the bend of drill pipe at the ocean's surface.

MODIFICATIONS of the 260-ft. Cuss I included the guide shoe directly beneath the rotary table, and a tapered casting fastened to the landing base on the ocean floor.

Mohole Drillers Reach 'Second Layer'

AIRCRAFT-LIKE 'JOYSTICK' is shown operating the specially designed console that simultaneously controls four outboard engines to position the drilling ship.

Experimental drilling in 12,000-ft. waters near Guadalupe Island, off the west coast of Mexico, has proved the feasibility of plans to drill Project Mohole—an attempt to drill through the earth's crust.

That was the prediction of scientists last weekend when basalt was encountered 560 ft. below the ocean's floor in 11,700 ft. of water.

Two cores of hard, fine-grained basalt were brought up from below 560 ft. in the "second layer." This is the first time this layer has been penetrated.

The gray-green clay encountered before reaching the second layer is believed to be of Miocene age.

With the possibility of the oil hunt moving into deep waters, oil men are watching this project with more than usual interest.

Several oil industry techniques have been adapted for the program, and equipment makers are helping out. Pan American Petroleum Corp.'s Arthur Lubinski, helped solve the problem of pipe stress during drilling, and Texaco's C. Don Woodward is superintendent.

The drilling ship, Global Marine Exploration Co.'s Cuss I, was held in position with four diesel-powered motors mounted at the corners. Sonar readings from a ring of buoys help the pilot position the vessel.

What's New IN THE INDUSTRY

The Independent Petroleum Assn. of America, in a mild but provocative statement, took Internal Revenue Commissioner Mortimer L. Caplin to task last week for criticizing percentage depletion at the National Press Club.

"Both President Kennedy and Treasury Secretary [Douglas] Dillon have indicated that no change should be made in the depletion provisions without a thorough and objective study by Congress," IPAA counsel L. Dan Jones declared. "Yet here we find Commissioner Caplin advocating changes to the country at large, without benefit of consultation."

•

A "small but significant" victory over the Teamsters Union was claimed last week by the Oil, Chemical & Atomic Workers Union. OCAW won a National Labor Relations Board election in which employees of a Sinclair Oil Co. bulk station and terminal in Youngstown, Ohio, voted 10-to-0 to desert the Teamsters and affiliate with OCAW. An OCAW spokesman described Ohio as a "major battleground in organizing efforts among bulk station, terminal, and marketing workers."

•

Gulf Oil Corp. is moving its Western Hemisphere exploration division, formerly known as the New York exploration division, to Coral Gables, Fla., next week to improve liaison with its Central and South American operations. The transfer will affect 26 employees, including T. A. Kibby, division manager; C. H. Neff, exploration manager; R. H. Leitch, financial and services coordinator; W. C. Lamb, chief geophysicist; and L. C. Sass, chief geologist.

•

Mustang Fuel Co., of Oklahoma City, will start construction shortly on a 75-mi., $1.5-million gas transmission and gathering line between Piedmont and Oakmont, Okla. An existing line also will be extended 8 mi. southwest from Newcastle.

The new line will have a capacity of 30-million cf/d. Half of it will be 12-in. line, with the balance 8 in., 6 in., and 4 in. in diameter. The 8-mi. extension, which will cost about $400,000, is scheduled to be completed around June 1. It is being built to serve the Northwest Blanchard pool, which was opened last year in Grady County.

•

Daniel B. Purvis, Texas lawyer and independent producer, is the new chairman of the Federal Petroleum Board. The appointment was made by Interior Secretary Stewart L. Udall. The board administers the Connally Act.

•

Data compiled by the Assn. of Oil Pipe Lines indicate that twice as many miles of oil pipelines were constructed in 1960 as in 1959.

The association estimated 1960 mileage at 4,134 mi., and aggregate costs at $133.8-million. The 1959 totals were listed as 2,029 mi. and $88.9-million.

•

A new division to spearhead its recent diversification into real estate development is being set up by Hydrocarbon Chemicals, Inc.

A spokesman says the company grossed more than $1.4-million in land development in its first six months in the real estate field. The new division will be known as Hydrocarbon Realty Development Co.

•

Union Oil Co. of California expanded its operations in the Hawaiian Islands with the purchase of certain assets of Pacific Chemical & Fertilizer Co., a Hawaiian corporation in the process of liquidation, for $6.5-million.

Assets purchased include 10.4 acres in the industrial area of Honolulu, and the Pacific Guano Co., a subsidiary which markets petrochemicals in the West Coast.

•

Joint annual meetings will be held May 25 by the Pennsylvania Grade Crude Oil Assn. and the Bradford District Pennsylvania Oil Producers Assn. at Pennhills Club, near Bradford, Pa. It will mark the first time that the two groups have held their sessions concurrently.

Speakers will include Sen. Hugh Scott (R., Pa.), Lawrence J. O'Connor, Jr., oil imports administrator, and John J. Balles, vice-president of Mellon National Bank & Trust Co., Pittsburgh.

Looking Ahead in Washington

PETROLEUM WEEK

April 7, 1961

Congress bears close watching now, because members are returning from their first trips home since President Kennedy took office. Exposure to constituents and political friends at home will give each congressman a personal reading on Kennedy's impact on voters. If they find Kennedy as popular as polls depict him, the President's program will move faster. If the voters aren't excited, Congress will continue to move at its own pace.

Minimum wage legislation should provide a reliable test of the mood of the House, which has already turned down Kennedy's bill, by a single vote. But the Senate is likely to pass the measure, raising the hourly minimum to $1.25 in steps, and adding coverage for about 4-million workers. Liberals will then represent the House in conference with senators, with the result that the House will have to vote again on a bill fairly close to Kennedy's wishes. This could bring a crucial fight between Administration supporters and the Republican-Southern Democrat coalition.

•

Justice Dept. antitrusters will have to settle for the back seat when natural gas pipeline mergers are considered. That's the important general effect of the decision of the U.S. Court of Appeals for the District of Columbia upholding the Federal Power Commission's approval of the merger of Pacific Northwest Pipeline Corp. into El Paso Natural Gas Co.

The Justice Dept. tried to break up the merger in the U.S. District Court in Utah. After the suit was filed, the companies asked for—and got—FPC sanction of the merger. The question of whether FPC or the Justice Dept. has "primary jurisdiction" then became the key issue in the case.

•

Pentagon oil buyers will test the plan to swap U.S. surplus farm commodities overseas for oil products. The Military Petroleum Supply Agency has prepared an invitation for bids on 6.2-million bbl. of Navy Special fuel oil for use in the trial run. The oil, for use on the East Coast, is traditionally supplied from imports. MPSA plans to use its own residual fuel oil quota, as an incentive for companies to try the plan.

Oil companies wouldn't be involved in handling the commodities, because international trading companies will be the brokers. Successful bidders would arrange for the trade with the Commodity Credit Corp. Trading companies would sell surplus wheat, or other crops, then pay the oil companies in "hard" foreign currencies. The program is intended to reduce the gold outflow from the U.S., and to dispose of surplus crops.

•

Coal interests have won a round in their attempt to take part in gas pipeline rate cases. Coal lawyers regularly appear in cases involving expansion of gas service. Now they want the right to fight gas rates they say are designed to make industrial gas sales competitive with coal. The Third U.S. Circuit Court of Appeals upheld FPC action letting coal men into a Northern Natural Gas Co. rate proceeding.

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...with

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- **LEASE CRUDE** or other available light hydrocarbons may be used.
- **LOW FRICTION LOSS** to help reduce surface horsepower requirements.
- **LOW FLUID LOSS** to cut waste — retains more fluid *in the fracture* for improved efficiency.
- **CONTINUOUS BLENDING** of crude, gelling agent and propping agents can eliminate batching.
- **BUILT-IN BREAKER** can be employed to speed return of fracturing fluid.
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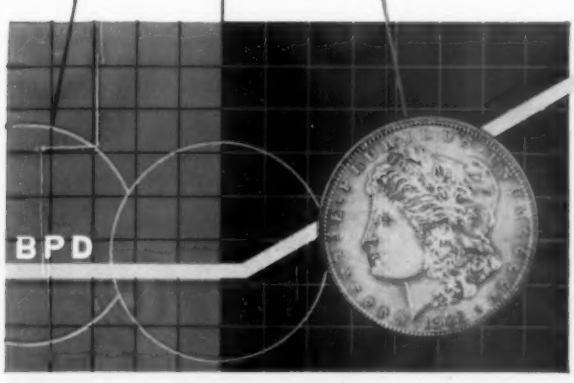
EXCELLENT PROPPING AGENT CARRIER due to the gelled structure of the treating fluid.



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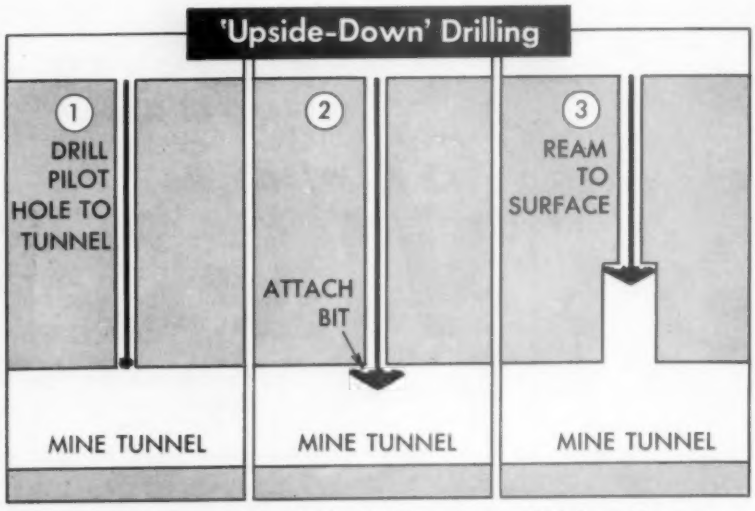

UNIQUE BIT (left) reams hole upward. Drawings (right) show steps in 'upside-down' drilling process, which is used by some . . .

Contractors Busy in Minerals Search

Exploration for various nonpetroleum minerals is keeping contractors with portable drilling rigs busy in the western United States, despite a slowdown in oil activity.

Many contractors who faced the possibility of stacking their equipment because of the slackening in oil drilling have turned to these new activities with good success.

One contractor is reported to have a $2-million to $3-million contract to outline ore veins in Nevada by drilling.

The contractors are getting these opportunities to keep busy because several oil companies have diversified into the search for nonpetroleum minerals, often requiring some drilling activity (PW—Jul.8'60,p.19; Dec.5 '58,p28).

Suppliers and manufacturers are profiting from diversification of exploration activities, too. Specially designed and manufactured equipment is needed in the search for some minerals.

The minerals sought include uranium, beryllium, potash, and helium-bearing natural gas. They are found in most of the western United States. New Mexico, Arizona, Nevada, and Utah are especially active areas.

One of the so-called glamour ores, beryllium, is one of the most sought-after minerals because of its increased use in aircraft and missile components.

More than a dozen contractors are keeping some 18 rigs active in west-central Utah, currently one of the hottest spots for beryllium. Scott Bros. Drilling Co., Grants, N.M., has two portable units working near Delta, in the Topaz Mountain district, and Boyles Bros. Drilling Co., Salt Lake City, is running two rigs some 50 mi. north, near Eureka.

Drilling for beryllium is hindered, however, by hard volcanic rock, which covers the mineral deposits.

Boyles Bros. has also been drilling test holes for potash between Carlsbad and Hobbs, in southeastern New Mexico.

Four Corners Exploration Co. is involved in exploration for uranium in the Ambrosia Lake district of New Mexico.

Holes drilled to about 1,200 ft. for helium-bearing gas near Navajo, Ariz., have yielded good results. This is the area in which Kerr-McGee Oil Industries, Inc., plans to build a helium plant. C. C. Smith Drilling Co. of Lubbock has been among the more active contractors here.

Development of "upside-down" drilling, a technique for boring large-diameter holes, is providing considerable work for several contractors in connection with uranium mining. Most of this activity is centered around Grants, N.M.

The process is used to make holes from the surface into mine drifts, or tunnels, for use as ventilation or escape shafts, or for transmission of fill.

The technique involves: (1) drilling a small pilot hole to a mine tunnel with a conventional rotary rig; (2) attaching a large, specially designed bit from inside the tunnel; and (3) reaming to the surface.

Says Irving Rapaport, manager of Four Corners Exploration Co., "Chief advantage of the method lies in the fact that the mining areas usually are highly fractured and susceptible to circulation loss."

Compressed air is used as the circulatory medium in upside-down drilling. This decreases the hazard of stuck tools and increases the rate of penetration.

Says Rapaport: "Neither excessive bit wear nor bearing fatigue has been experienced, as we are obtaining 250 ft. to 400 ft. of hole from retipped bits."

Drilling a vent shaft to hit a mine requires considerable preparation to insure that the shaft meets the tunnel.

"Conventionally drilled holes often deviate a considerable distance from their surface locations," says Rapaport "and a 6- to 10-ft. mine passageway can be a tough target at 300 or 400 ft.—especially when extensive surface and underground surveying is required to locate its position.

"It is usually imperative that the drill hole penetrate the underground workings at an exact predetermined point."

Previously drilled exploratory holes are sometimes encountered while digging tunnels. These existing holes can

to waterflood operators who do not fracture wells

A few operators are still afraid to fracture waterflood injection and producing wells in spite of the fact that fracturing programs for waterflood projects are widely accepted. Here are some questions frequently brought up by these operators. The answers are based on records of thousands of treatments performed by Dowell.

QUESTION:

Will fracturing hasten breakthrough between injection and producing wells?

ANSWER:

Generally speaking, *no!* A poorly-designed fracture treatment of a producing well — performed too early in the life of a flood — can hasten breakthrough. In practice, however, this seldom happens.

Normally, breakthrough has been either unaffected or actually retarded by Dowell-engineered fracture treatments that were performed at the correct time.

QUESTION:

Will a premature breakthrough reduce ultimate economic recovery?

ANSWER:

If breakthrough does occur between an injection and a producing well, loss can usually be avoided by an appropriate change in the well pattern.

Dowell-engineered fracturing, however, has generally reduced, rather than increased, premature breakthrough.

QUESTION:

Will breakthrough to formation water reduce economic recovery?

ANSWER:

Loss can usually be avoided by changing the pattern of producing wells and injection wells. If formation water is likely to be a problem, however, Dowell engineers often design treatments to avoid breakthrough.

QUESTION:

Will fracturing affect water/oil ratios?

ANSWER:

Not in a consistent manner. Water/oil ratios may be increased, unchanged or reduced by fracturing. This is usually unimportant, however, since a waterflood that has been fractured should accommodate a higher water cut economically than one that is operated without fracturing. Dowell engineers design treatments on waterflood wells to avoid excessive water production.

QUESTION:

Will fracturing increase water handling costs?

ANSWER:

Fracturing programs have generally *reduced* water handling costs per barrel of oil produced. The daily costs of water handling may be increased, since so much more water is being handled, but oil production is usually increased so much that cost per barrel of oil is reduced.

Dowell engineers regularly design fracture treatments to minimize water pumping costs.

QUESTION:

Will fracturing costs reduce net profits?

ANSWER:

Fracturing costs have been negligible when compared with the savings realized. When successful fracturing programs are employed, fewer wells are required and well spacing can be wider. Since frac jobs are considerably less expensive than the drilling of new wells, the investment required for a given flood is decreased rather than increased by a successful, well-planned fracturing program.

When a successful fracturing program is initiated, daily production is increased while operating costs are affected little if at all; the result is lower operating costs per barrel of oil.

Dowell-engineered fracturing programs have been outstanding in helping waterflood operators increase net profits.

To summarize, waterflood operators have everything to gain by checking on the advantages of fracturing wells in a flood. For full information, call your nearest Dowell representative. Dowell services and products are offered from more than 150 offices and stations in the United States, Canada, Venezuela, Argentina, Germany, France and the Sahara area. Dowell, Tulsa 1, Oklahoma.

SERVICES FOR THE OIL INDUSTRY

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often be reamed to a larger size for a mine vent, he adds.

The usual procedure is to drill a 4½-in. exploratory hole, then ream it upward from the bottom with progressively larger bits.

Most contractors use an 8 4/8-in. bit first, then one 13¼ in. in diameter. Holes up to 36 in. in diameter are possible, but it appears 24 in. may be the maximum economic size.

"In my opinion, holes in excess of 24 in. may not be economic with a light rig at depths below 300 ft." Rapaport says. "And drill pipe also takes a severe beating in holes over 24 in. in diameter."

Holes averaging 300 ft. in depth can be completed in approximately 24 hours, including drilling, reaming, and the time required to attach the bit underground and set surface pipe to solid rock.

No major mechanical problems have appeared, but broken drill pipe, underground dust, and the possibility of caving present some difficulties in upside-down drilling.

Rapaport calls twist-off "the chief danger" because of the lightweight pipe used, but says he knows of only two such failures, both in 36-in. holes.

The reaming process creates a large amount of dust in the mine, making working conditions there intolerable. For this reason, much drilling is done in parts of the mine not currently in use, or over weekends, when they are not being worked. A water spray at the base of the hole helps reduce the amount of dust.

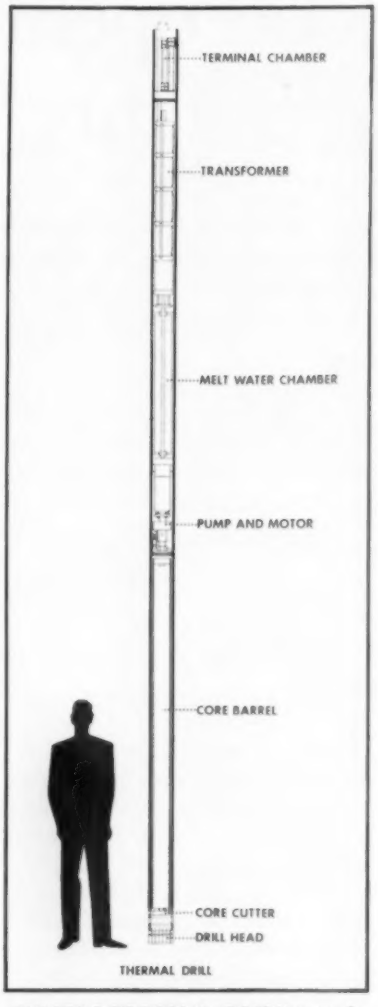
There is sometimes danger of cave-ins because the surface area often is composed of 50 to 80 ft. of highly unstable alluvium and dune sand. There have been two reported instances of the ground caving in, but men and rigs escaped injury or damage both times.

The cave-in danger can be countered by placing long timbers beneath the rig, or by drilling and casing a large hole through the incompetent sediments prior to upside-down drilling.

Four Corners has drilled some 20 upside-down holes in the Grants area. Phillips Petroleum Co. and Lee Ansel Drilling Co. have accounted for 20 more.

Four Corners has used Failing 1500 HD Holemaster rigs for the work. They have specially made jaws that grasp the drillpipe and apply upward pressure with the rig's hydraulic pull-down. Rigs with chain pull-down also can be used, but they require that a cellar be dug to permit breaking out pipe.

Kellys are not used.



ELECTRO-THERMAL 'DRILL' is 23 ft. long, contains heating element in "bit."

ICE CORE must be removed from drill each time it bores through 10 ft. of ice.

Hot 'Drill' Penetrates Ice

Army engineers in Greenland are penetrating nearly two miles of ice with an electro-thermal "drill" that could be of significant use in prospecting for oil in polar regions.

The electrically heated wireline drill was developed for the Army by Pollak & Skan, Chicago consulting engineers, because mechanical drilling methods similar to those used in rock drilling do not work well in ice below 1,300 ft. in depth.

It is anticipated that bedrock will be reached under as much as 12,000 ft. of glacier ice by use of the thermal drill.

The Army engineers hope to obtain data on temperature profiles, flow velocity profiles, seismic wave velocities, and chemical composition for use in various military applications. They also want to determine the plasticity of ice as a function of depth and stress conditions, and they want to know whether there is wet ice near bedrock.

Oil men could make use of the thermal drill in seismic prospecting in areas covered by thick layers of ice and snow.

Seismic methods are still uncertain when thick ice is encountered.

Using the thermal drill, a hole can be bored down to the bedrock and the seismic equipment placed in direct contact with solid rock, permitting more accurate readings than are now possible.

The 23-ft.-long thermal drill, as its

name implies, melts its way through ice by means of electrically generated heat and its own weight. It is the first known device capable of reaching the bottom of many arctic ice formations.

The drill weighs 800 lb. and cuts a hole 6½ in. in diameter. An annular heating element 6¼ in. in diameter operates at 400F at the bottom of the drill. It melts away the ice around a core, which is retained inside a chamber in the drill. The melted water is pumped into a tank toward the top of the drill.

The drill will cut one 10-ft. core at a time. It must then be taken to the surface, where the core is removed and the melted water discharged from the tank.

Average drilling speed is 6 in. per minute. There is not much variation from this speed, since ice has fairly uniform density, especially compared to conditions encountered in drilling through rock.

The drill is suspended from a 30-ft. tower by a steel cable, through which electric power passes from a generator on the surface. The 12,000-ft. cable contains 12 electrical conductors. It is controlled from a winch on the surface.

A diesel generator supplies 2,300 volts, which a transformer contained in the drill reduces to 230 volts for use in the heating unit.

The hole is not cased during drilling. Wall collapse is prevented by keeping the hole filled with diesel oil during operations. The drill operates entirely submerged in the oil during the operation.

The hole formed by the melting is somewhat larger than the drill itself. This permits the oil to flow around the drill when it is pulled out or inserted. The drill is raised and lowered slowly, however, because of the pressure, and to prevent oil spillage.

The drill cannot safely move faster than 25 ft. per minute when going in or out of the hole. This speed limitation causes no problems when drilling, since it is considerably faster than the drilling speed, but it is quite time-consuming at considerable depths, when the drill must be withdrawn and emptied every 10 ft.

The drill is built solidly enough to withstand the pressure of a 12,000-ft. column of oil.

Some problems exist in drilling a straight hole, but close manufacturing tolerances help minimize them. The outside diameter of the drill does not vary more than 1/64 in. from its 6¼-in. diameter over its entire 23-ft. length.

Urge Use of Separate Drillstrings For Study of Corrosive Muds

Some Canadian drilling contractors may begin using separate drillstrings for electrolytic and nonelectrolytic muds. Reason: to determine what corrosive effects electrolytic muds have on equipment.

This is the recommendation made by an engineering subcommittee of the Canadian Assn. of Oilwell Drilling Contractors.

It was made after the subcommittee reported "discouraging" results in its search for data and information on possibly corrosive effects of electrolytic mud on drilling equipment.

The subcommittee sought to determine: (1) the effects of electrolytic mud on equipment, as compared with nonelectrolytic muds; and (2) if adverse effects were found to exist, what economical methods are now available to combat them.

"Unfortunately," the report said, "The problem is a very real one, and will continue to grow."

Though electrolytic-type drilling fluids have been used in several areas of the U.S. for many years, they are relatively new to Western Canada.

The subcommittee noted that information received from some areas in the U.S., where electrolytic muds are used because of necessity rather than choice, indicate that corrosion of drilling equipment is accepted as one of the factors involved in drilling in those areas.

In Canada, more than 80 holes have been drilled with electrolytic-type drilling fluids.

The subcommittee reported that while the existence of corrosion was found in the majority of cases in which electrolytic muds were used, "it also was simply accepted as something unavoidable.

"No effort was made to determine the effect on equipment life. In some cases, corrosion inhibitors were used, but again, no information is available on the effect of the inhibitors, or as to the economics of use."

Chromate-type inhibitors have been used in three-quarters of the holes drilled with electrolytic muds in Canada. But here again, results are not known.

The subcommittee reported that several corrosion inhibitors are commercially available, with the majority being chromates, in one form or another.

Some of the extreme pressure lubricants have been found to act as fairly good inhibitors in electrolytic drilling fluids, the subcommittee added.

Other types of inhibitors used include formaldehyde, lime water, and pH control with other various chemicals.

It's been found that while the basic fluid of electrolytic drilling fluids is corrosive, the rate of corrosion can be accelerated by increasing the amount of oxygen in the fluid and contamination by soluble salts.

When hydrogen sulfide is a contaminant, the subcommittee said, then the structure and composition of the metal becomes a very important factor.

In its simplest form, corrosion fatigue (as related to drill strings) may be considered as notch fatigue in which a stress-concentration point has been formed by a corrosion pit, and the fatigue process is hastened by the corrosion, the report added.

A solution of the problem, even with suitable inhibitors, demands a knowledge of the economics involved.

The subcommittee noted that this can be determined only by the availability of comparative data. The report continued:

"It is realized that the step necessary to obtain this data would involve additional cash expenditures, not only in compiling data, but in purchasing additional equipment and incurring all related costs. . .

"However, as with other problems, the solution cannot be obtained without research. . ."

Therefore, the subcommittee said, it is recommended that all drilling contractors in Western Canada accumulate such data on electrolytic drilling fluids and that data also be collected as to the effectiveness and economics of using currently available corrosion inhibitors.

The subcommittee noted that maintaining a separate drillstring for use with electrolytic drilling fluids "would not cost more, over-all, because the drillstrings used exclusively for nonelectrolytic fluids would last longer."

The subcommittee recommended further that records be maintained on drillpipe and collars as to footage and hours drilled, weight on bit, rotary speed, type of mud used, depths drilled, nature of drilling (crooked hole, hard or soft formations, and such-like), cost and type of maintenance, cost and type of failures, penetration rates, and cost per foot drilled.

Drilling Costs Can Be Cut Further

AAODC's Warren Baker spells out some cost-cutting ideas for both contractors and operators.

Operators and contractors must—and can—effectively reduce costs of drilling and completing wells.

That is one of the points stressed this week by Warren L. Baker, executive vice-president of the American Assn. of Oilwell Drilling Contractors.

Baker suggested several ways in which such costs can be cut in a talk to the Mid-Continent District, Division of Production, American Petroleum Institute, in Tulsa.

"What is good for operators is good for contractors," he said, "and what is good for contractors also is good for operators.

"Pushing the responsibilities and bills to some other party involved in the operations is not any economy. A more economical over-all operation for both contractors and operators must be the goal which both parties must seek."

One way to cut costs: operators should stop requesting submission of many bids.

Baker said this practice has increased so sharply in recent years it has become a general policy, rather than the exception. Such bid preparations take time, manpower, and money, he added.

Estimates on the cost of submitting a bid range from $100 up to $300, depending on distances contractors must travel in inspecting the location, completeness of bid specifications, and the like.

Such contract bid expenses run into millions of dollars yearly, he added. The question of whether a large number of bids is needed, Baker said, should be given careful consideration by producers. He added that it is likely producers can get as good a price from five or six bidders, as from many more.

Better bid specifications and multiwell contracts also can save money for both contractors and operators.

Before contractors can submit an intelligent bid, Baker said, they must know what they are to furnish, the risks for which they are to be responsible, plus information on many phases of the drilling program.

Baker said that bid expenses for both groups are increased by failure to provide necessary information. In requesting bids, operators should specify the proposed mud program, possible pressures to be encountered, crooked-hole possibilities, and names and locations of other wells drilled to the same formation in the area. Specifications should include information on the mud, coring, logging, and casing programs.

The contractor should acquaint himself with the specifications and requirements of the operator, plus local drilling conditions, he said.

Baker continued that the industry is not taking full advantage of letting multiwell contracts.

He cited a case in northern Oklahoma where properly planned multiwell contracts have led to an over-all reduction in drilling costs by more than one-third, despite increased labor and material costs.

In this case, locations are planned ahead, all preliminary site work is done in advance of moving tools to the location, drilling of rat holes has been eliminated, surface casing is set with cable tools, and when rotary tools are moved in, drilling starts with a minimum of lost time.

Drilling time also has been reduced through use of more weight, better bit programs, and not mudding-up until just before coring operations. Coring time, too, has been reduced through use of longer core barrels and cutting of full-gauge cores. This program, said Baker, has led to a 40% decrease in actual rotating hours, and a 60% decrease in average rotary time per well.

Haste in various operations, unnecessary cement time, and use of smaller casing also raise costs or create difficulties.

Baker said that haste can lead to extra costs in several ways which, collectively, add substantially to total costs. Hurried rig moves could lead to unnecessary transport charges; rushing bid preparations could cost several long distance calls; and safety and maintenance may be overlooked adding risks which can run into money.

Concerning cement time, Baker noted that some contracts continue to require 48 hours of cement waiting time on surface strings, though others are experiencing no difficulties when waiting only 24 hours. And some contracts continue to call for 72 hours cement time for production strings, though experience has shown 48 hours are adequate.

"Some companies have reduced waiting on cement time as much as three days by allowing 24 hours on surface strings and 48 hours on production strings . . . Three days saved on a rig which costs some $750 per day means an over-all saving of 30 cents per ft. on a 7,500-ft. well," Baker reported.

As for casing sizes, Baker said the tendency today in many areas is to set 8⅝-in. casing rather than 10¾-in. casing as surface pipe. But while this reduces pipe cost, the reduction is so small there is considerable doubt whether a reduction is achieved in over-all costs, Baker added.

He explained that if difficulties are met, the 10¾-in. pipe provides many advantages and possible savings "which will far exceed the small difference in cost of pipe."

Unrealistic mud specifications can boost costs. And use of bulk mud can reduce them.

Mud specifications is an area where good cooperation and proper planning between contractor and operator can cut costs, Baker said.

Baker noted that offset wells have been drilled with mud bills varying from $2,000 to $7,000. Yet both holes were serviced by reliable mud companies, and both proved satisfactory for drillstem testing and logging. The difference of $5,000, Baker added, reflects the differing requirements of two different operators.

Baker continued that the over-all size of the savings made through use of bulk mud is generally not appreciated in the industry. He said that on some locations, as much as 20% of the contractor's crew time is spent mixing sack mud. In addition, the contractor must provide a storage house and pay expenses of moving it from site to site.

Several other approaches to cost-cutting can be taken.

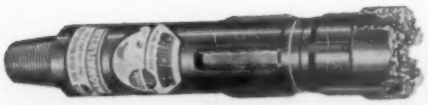
One of these, said Baker, is a relaxation of limitations on hole deviation. Directional holes have proved that both contractors and operators can live with substantial over-all deviations from vertical, if there are no sharp hole angles.

Other practices that can cut costs are the following, Baker said:

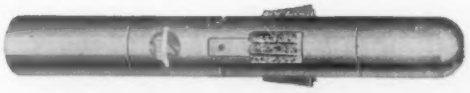
- Make equipment requirements reasonable.
- Reduce blowout-preventer requirements.
- Minimize substructure heights.
- Reduce the trend to accelerating wear of drillpipe.
- Increase cooperation between contractor and operator by consultation and joint planning.

SERVCO TOOL GUIDE

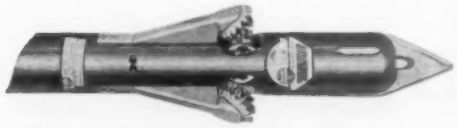
8 ways to lower drilling costs



JUNK MILLS Tough, rugged tools for chewing up bit cones, packers, drill pipe, junk of all kinds—at rates that make fishing uneconomical.



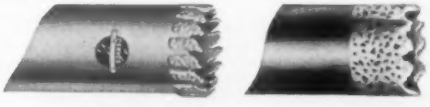
SECTION MILLS Mill any length section at rates up to 4′ per hour. Often complete window cut with one set of arms. Mill all weights of casing from 5″ to 13⅜″ O.D.



HOLE OPENERS *Rock Bit Type:* Opens hole up to twice the bit diameter in hardest formations. Also, *Blade Type* increases hole diameter up to 17″, simultaneously with drilling, in soft to medium formation.

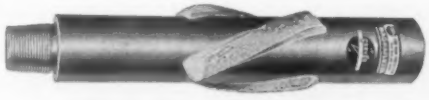
PILOT MILLS Mill wash pipe, casing, liner, liner hanger, drill pipe or tubing at rates up to 10′ per hour; drill collars up to 2′ per hour. The perfect tool for swaged casing completions.

TAPER MILLS Mill collapsed casing, enlarge holes through adapters or retainers, mill out dented casing, and for general reaming.



ROTARY SHOES Difficult washover and milling jobs completed in a fraction of the time required by conventional shoes. Tooth type to cut formation; perforated type to cut iron and formation.

REAMER-STABILIZERS Keep hole to gauge in the roughest, sharpest sands. Save rig time and money by eliminating double drilling and separate reaming operations. SERVCOLOY "W" resists wear 5 to 10 times better than conventional hardfacing.



STABILIZERS *Welded Blade Type:* rugged, low cost tools with welded wrap-around wings. *Model "B":* Replacement wings quickly changed without removing body from string. SERVCOLOY "W" makes tools last 5 to 10 times longer than conventional hardfacing.

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WHAT REFINERS SHOULD EXPECT FROM ANTIKNOCK SUPPLIERS... NOW, AND IN THE FUTURE

Today's gasoline is a mixture of many hydrocarbons and it is also a blend of many important decisions on the part of the refiner.

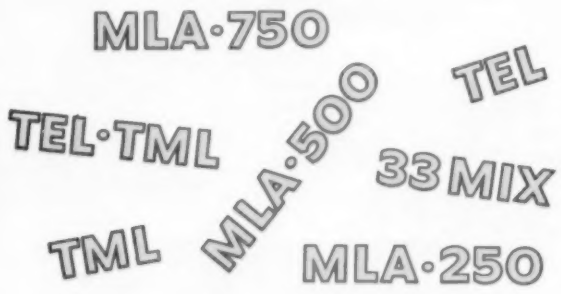
One important decision today is how to bring into agreement four factors—fuel composition, car population requirements, the best antiknock for a specific fuel and marketing objectives—to produce the most satisfactory and most profitable fuel.

The solution to the problem of matching fuel composition and antiknock is a complex one but, at the same time, one that can be rewarding in terms of better road performance at the same or less cost. Essentially it involves the optimum allocation of components and the blending of the right antiknock in the right concentration.

The selection of the antiknock is vital for it can contribute to the correction of an antiknock deficiency in a fuel, such as unsatisfactory motor octane and/or road performance, and at the same time reduce costs.

Changes in engine design and engine size are changing the octane requirement of the car population. Especially do foreign and compact cars have their own peculiar demands for fuel that will operate them satisfactorily at an economical cost.

Because there are so many factors that must be taken into consideration, the problem becomes quite complex. It is here that the antiknock supplier should be in a position to help in arriving at the best possible solution. That is why Ethyl is now even more actively engaged than ever in a program that will enable us to assist refiners in finding their own individual answers to: "Which antiknock—*exactly*."



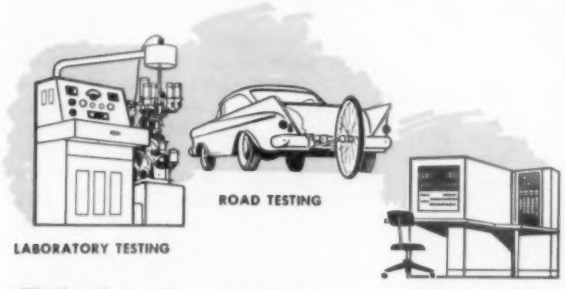
No single antiknock enough

In prior years, changes in fuels and fuel-engine relationships were met satisfactorily by changes in the formulation of the one antiknock compound universally used by the oil industry.

Today, however, because the hydrocarbon composition of components varies from company to company—and even between refineries in a single company—no one antiknock can any longer be best for the whole industry or even for a single company. Therefore, to meet

ETHYL
ANTIKNOCK COMPOUND
ETHYL CORPORATION

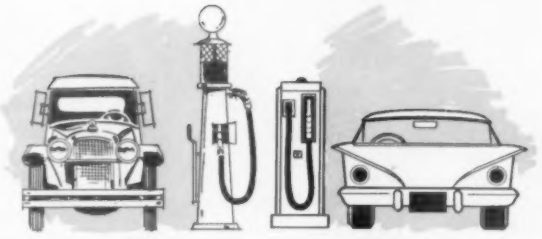
the industry's needs, Ethyl is now offering a number of antiknock compounds.



Ethyl takes action

To assist refiners in the selection of the antiknocks best suited to their needs, Ethyl has broadened its long-term program of matching fuels and antiknocks. A number of antiknocks, and combinations of antiknocks, are being tested in hundreds of gasoline blends from many refiners. These tests are for both laboratory and road rating and will be related to cost effectiveness. This project will produce a wealth of timely information for the individual refiner.

From this information it will be possible to make precise selection of an antiknock to insure optimum processing balance and minimum refining costs. In addition, an antiknock thus selected might well supply a refiner with an exclusive and promotable benefit that can be invaluable in the marketing function.



No substitute for experience

Long experience in the technology of antiknocks is necessary for the development of new antiknocks and their manufacture. Knowledge of the manufacture of one antiknock does not necessarily mean the knowledge required for the manufacture of another. While there may be surface similarities, there are often significant differences.

It is also experience that is the necessary ingredient in holding costs down. The successful, economical production of a finished product results from a complete know-how of the many processes involved and their economical operation.

Ethyl, with its 37 years' experience in this field, feels that it is especially suited to be of invaluable assistance to any refiner, regardless of size, who is facing the problem of: "Which antiknock for *us!*"

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What's New / IN EXPLORATION, DRILLING, PRODUCTION

Louisiana Offers 230,000 Acres for Lease

The Louisiana State Mineral Board will hold the state's second-largest lease offering Apr. 20, with more than 230,000 acres, both onshore and offshore, going on the block.

The offering includes 42 offshore tracts totaling 116,000 acres, and some 100 tracts in south Louisiana amounting to 102,000 acres.

The state's largest lease sale was in February, 1959, when 256,297 acres were offered. A record bonus of $57,726,445 was paid for 152,384 acres in that sale.

•

Texas Land Sale Nets $1,837,000

The University of Texas' auction of oil and gas leases last week netted $1,837,000 for 28,000 acres.

Humble Oil & Refining Co. leased seven tracts, totaling 1,125 acres, in Ward County for $446,000 bonus, plus the usual one-eighth royalty. The high bid of the sale, $140,000 for a 160.65-acre tracts, was included in this group.

The leases sold are in Andrews, Martin, Upton, Reagan, Crockett, Terrell, Pecos, Ward, Loving, Culberson, and Windler Counties.

This was the 43rd auction of leases on University of Texas land. Previous sales had brought $160,756,092 in bonuses for 1,400,873 acres.

•

Operators expect to recover more than 30-million bbl. of oil from two waterflood projects in West Texas.

Pan American Petroleum Corp. and others estimate additional recovery of 25-million bbl. under a unitization project approved by the Texas Railroad Commission for Midland Farm field, Andrews County. The program calls for water injection into 16,089 acres of the Grayburg formation at 4,800 ft.

Standard Oil Co. of Texas anticipates recovery of 5.1-million additional bbl., by waterflooding five leases in the Iatan-Howard area of Howard and Mitchell Counties.

•

A $5-million gas cycling project has been approved by operators for a field in Alberta, and a company has been formed to build and operate a previously announced $13-million plant in another Alberta field.

Canadian Superior Oil of California, Ltd., as operator, says a $5-million plant in Harmattan-Elkton Unit No. 1 will be built as an addition to an existing conservation plant, and will cycle approximately 100-million cf/d from the field gas cap and some 10-million cf/d from the conservation project. It will produce an estimated 4,700 b/d of condensate. The plant is expected to be ready for operation by January, 1962. Application for approval has yet to be made to the Alberta Oil & Gas Board.

In Calgary gas field, Petrogas Processing, Ltd., has been organized by 28 oil and gas companies to own, construct, and operate a $13-million gas processing and sulfur manufacturing plant (PW—Nov.25'60,p20).

H. W. Manley, vice-president and managing director of Jefferson Lake Petrol Chemicals of Canada, Ltd., is president of Petrogas.

•

A turbodrill has been used successfully by a French company to clean and redrill a sand plug in a producing well.

The company, Flopetrol, used a 3½-in., 52-stage Tiraspolsky turbodrill on a 1,930-ft. Paris Basin well which was sanded up over 60 ft. on bottom.

The turbocleaning equipment was built by Soc. Europeenne d'Equipment de Turboforage, Paris.

•

New Soviet equipment for deep drilling will be tested on a hole planned to be the deepest yet in the USSR.

The hole, which is scheduled to be started in May, is programmed for 19,700-ft. on the Apsheron Peninsula of Azerbaijan.

A combination of rotary and tur-

Shell ACT System Is Offshore's Largest

This 10,000-bbl. surge tank was installed recently by Shell Oil Co. in the Eugene Island Block 18 field off Louisiana. It is part of the company's automatic custody transfer system that will meter and check some 8,500 b/d of crude and condensate from 57 oil and four gas-condensate wells in the field, making it the largest such installation off the Louisiana coast, according to Shell. A 500-bbl. "bad oil" tank (rear of picture) and the ACT system are supported on one platform, made of precast concrete, as is the platform supporting the surge tank.

bine drilling will be used, according to the publication Ekonomicheskaya Gazeta.

•

Producing Properties, Inc., Dallas, has paid $18-million for the oil and gas holdings and nonproducing acreage of Shoreline Petroleum Corp., San Antonio.

Involved in the deal are 260 net oil and gas wells in Texas, Oklahoma, Kansas, Nebraska, Illinois, New Mexico, Colorado, and Wyoming, plus some 55,000 acres of undeveloped leases. Oil production approximates 2,200 b/d net and gas production exceeds 25 million cf/d.

Robert J. Bradley, PPI board chairman, says the purchase adds 13-million net bbl. of crude and 70-billion net cu. ft. of gas to his company's reserves.

Viking Drilling Co., San Antonio, a Shoreline subsidiary, was not involved in the transaction.

•

Lone Star Producing Co., Dallas, has contracted to buy the interests held by R. L. Kirkwood, San Antonio, in 101 oil wells and 21 gas wells in Southwest Texas.

Effective date of the transfer is retroactive to Feb. 1. Purchase price was not disclosed.

The wells are in Atascosa, Live Oak, Goliad, Dewitt, Duval, Webb, Refugion, and Bee Counties.

•

Shell Oil Co. will build a multi-million-dollar gas processing and sulfur plant in the Bryans Mill gas field, Cass County, East Texas.

The plant, which is scheduled to go into operation at the end of the year is designed to process 30-million cf/d of gas and produce 5,700 b/d of condensate, 130 long tons a day of sulfur, and 18-million cf/d of residue gas.

•

A technical report on fracture conductivity has been prepared by Dowell Division of Dow Chemical Co. to be used in conjunction with its "Frac Guide" (PW—Mar.13'59,p21).

The report, based on experiments in the Dowell laboratories, contains information on the single-point entry technique, designed to obtain a single, high-capacity fracture instead of multiple fractures, and the use of monolayers of propping agents in fractures, as opposed to packing.

The report is available without charge from Dowell in Tulsa.

Skelly Oil Co. was high bidder at the sale of oil and gas leases by the Oklahoma School Land Commission last week.

Skelly bid $15,798 for a half interest in 155.4 acres in section 8-24n-24w, Ellis County.

Bids on 40 of 43 tracts offered amounted to $146,256 for 5,120 acres.

•

Drilling Highlights

Oklahoma—Mobil Oil Co. No. 1 Horton, section 14-15n-15w, Custer County, was dually completed for 188 b/d of 42-gravity oil and 800,000 cf/d of gas through 10/64-in. choke and perforations at 9,722-78 ft. in the Oswego. This is the first oil production in the county. The well previously was completed in the Meramec for 1,017,000 cu. ft. of gas and 8 bbl. of condensate in 15 hours through perforations at 13,192-215 ft. The discovery is 7 mi. east of North Custer pool.

British Columbia—Union Oil Co. of California No. 4-14 Zama Lake, lsd 4-14-111-9w6, 75 mi. southeast of Kotcho Lake gas field in the northeast quarter of the province, flowed 10-million cf/d of gas on drillstem test in the Watt Mountain at 5,114-46 ft.

West Texas—J. E. Jones Drilling Co. and Blanco & Stolz No. 1 Wilkinson, section 2, block 34, T-1-N, T&P survey, Martin County, was completed for 232.6 b/d of 39-gravity oil through perforations at 7,512-17 ft. and 7,522-26 ft. in the Spraberry. The well is 4 mi. west of the Varel San Andress pool, Howard County.

Kansas—Sunray Mid-Continent Oil Co. No. 1-A Melville Harper, section 18-34s-21w, Clark County, flowed 1.1-million cf/d of gas through perforations at 5,374-90 ft. in the Morrow. The discovery is 2½ mi. north of Snake Creek pool.

Alabama—Hunt Oil Co. No. 1 Tyler Odom, section 13-3n-4w, Washington County, was abandoned after setting a new state depth record of 18,716 ft., 3,057 ft. deeper than the old mark set in 1948. The venture had some oil and gas shows.

Northwest Territories—Imperial Oil Ltd., and Sun Oil Co. No. 7-F Netla, 60 degrees, 40 minutes, 15.04 seconds north latitude, and 122 degrees, 46 minutes, 15.02 seconds west latitude, some 95 mi. north of Celibeta Lake, flowed gas at the rate of 6.8-million cf/d on drillstem test of the Middle Devonian at 6,394-442 ft.

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MARTIN PLUNGER BODIES, precision grooved, drilled and threaded (no underneath fluid passage), usually last for years. Tube or barrel costs are often cut in half.

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Question for management:

Which strategy would you chose in introducing a new product?

PLANT SIZE		PRICE		STRATEGY		
BIG?	+	HIGH?	=	BIG PLANT HIGH PRICE	BIG PLANT MEDIUM PRICE	BIG PLANT LOW PRICE
SMALL?		MEDIUM?		SMALL PLANT HIGH PRICE	SMALL PLANT MEDIUM PRICE	SMALL PLANT LOW PRICE
		LOW?				

Two possible answers:

Estimate rates of return for three levels of demand

MINIMUM RISK

	HIGH PRICE	MEDIUM PRICE	LOW PRICE	
HIGH DEMAND	16%	14%	12%	BIG PLANT
	10%	10%	8%	SMALL PLANT
MEDIUM DEMAND	10%	7%	12%	BIG PLANT
	13%	10%	6%	SMALL PLANT
LOW DEMAND	−2%	−1%	0%	BIG PLANT
	2%	4%	1%	SMALL PLANT

(The estimates are determined by computer simulation)

Estimate the 'regret level'

MINIMUM REGRETS

	HIGH PRICE	MEDIUM PRICE	LOW PRICE	
HIGH DEMAND	0	2	4	BIG PLANT
	6	6	8	SMALL PLANT
MEDIUM DEMAND	3	6	1	BIG PLANT
	0	3	7	SMALL PLANT
LOW DEMAND	6	5	4	BIG PLANT
	2	0	3	SMALL PLANT

(The 'regret level' is the deviation from the highest rate of return in each demand category)

Science Clarifies Risk—and Regrets

Oil and chemical companies are becoming increasingly concerned with a problem that is important to them both: determining strategies for introducing new products.

This month, chemical engineers in oil and other companies in the East will discuss this problem at a regional gathering of the American Institute of Chemical Engineers.

With the rash of new petrochemical products pouring from processing laboratories every year, oil and chemical companies often must cope with costly pilot tests before the companies can expand productive capacity and decide on market strategy.

One tool has emerged that may make costly market tests unnecessary —venture analysis.

It is this topic that will occupy the chemical engineers this month, at the Philadelphia meeting of AIChE.

Through venture analysis, management can weigh numerous alternative courses of action and, at the same time, keep an eye on the risks introduced by forecast uncertainties.

Venture analysis, broadly defined, has always been a part of the oil industry's approach to new product commercialization.

But through the introduction of computers, a much higher degree of sophistication and a broader range of analysis is made possible.

One engineer who has made this clear is Sigurd L. Andersen, of E. I. du Pont de Nemours & Co. Anderson spoke earlier this year to AIChE, explaining how he would apply venture analysis to a new-product problem.

Venture analysis, although a complicated tool, can be crystalized into a rudimentary form.

In actual practice, management is faced with a myriad of decisions, covering a wide range of possibilities,

when it decides to manufacture a new product.

But only two variables—plant size and pricing strategy—need to be considered to gain an understanding of venture analysis. And each of these variables may be limited to two or three possibilities.

Management is faced, too, with a range of forecast possibilities, whereas only three demand conditions in a single market may be created to explain this management tool.

Venture analysis may be more usefully applied when the whole market is segmented into many submarkets and forecasts are drawn for each.

This new approach to strategy analysis enables management to express its new-product philosophy in clearly demonstrative terms.

In using this analytical tool, management's first step is to determine expected rates of return for each combination of plant investment and pricing strategy (or any other crucial manufacturing and marketing factors).

Anderson has shown, too, that other criteria, such as net cash flow, may be used instead of rate of return as the determining factor.

Since management cannot be certain of the size of the market for which it is aiming—to say nothing of the penetration its new product will make—it must work with more than one forecast of demand.

But after having summarized the data, logic, and uncertainties of the problem in a computer program, and translated them into possible decisions, management is ready to explore its wide range of alternatives.

In the problem shown on page 34, hypothetical rates of return from the six alternative strategies (and the three forecasts of demand) are arranged in the left hand set of boxes.

Suppose that the company is bent on minimizing risk. Its management may then decide on a small plant and a medium price range for its new product, basing its decision on the lowest possible rate of return that would respond to its strategy.

Assuming that the company did not vary this strategy later, the company could anticipate at least a predetermined minimum rate of return, regardless of the demand that greeted the product.

But this defensive approach may well lead to too many "regrets," should demand prove to be moderate or high.

To answer this problem, Andersen has introduced a "regret" concept and has shown how maximum return can be achieved while regret is minimized. This "mini-max" approach calls for subtracting each expected rate of return from the optimum rate in each forecast. (A computer would do this rapidly, regardless of the number of cases involved.)

After considering the possible deviations from optimum return, management may discover that a different strategy is called for. For example, it may decide that a large plant and a low price range would be best for minimizing "regret."

Regardless of the demand, the company could expect to derive a rate of return that is a known deviation from the optimum.

A more venturesome management that has reason to expect at least a moderate demand for its product might want to strike out for the best possible return it can expect.

In this case, it may build a big plant and adopt a high price for its product.

It is clear, throughout, that venture analysis does not provide a single answer to the problem of commercializing a new product.

Indeed, a timorous faction in management may call the big plant-high price strategy much too rash, in light of the disastrous results ensuing from a low demand, however unlikely. This group might urge that the high price structure be retained, but that investment be held to a small plant.

Venture analysis may also take into consideration the counter-reactions of competitors and the adjusments made by consumers.

Anderson has suggested that new sets of interrelating variables (such as the pricing policies of customer industries) be introduced to consider this phase of the over-all problem.

MODEL of computer system is explained by C. M. Janes (right), Ohio Oil's manager of data processing, to F. S. Slick, controller, left, and to C. Z. Hardwick, a director.

Ohio Oil Adds $1.5-Million Data System

Ohio Oil Co. is installing an IBM 7070 electronic computer to speed up its data processing operations.

The machine can add 16,660 five-digit numbers in one second.

In addition, Ohio Oil is purchasing two IBM 1401s, which will act as satallites to the 7070, feeding it preprocessed information on operating problems.

The whole complex is valued at almost $1.5-million.

The first problem the computers will be assigned—when they go into operation about May 1—will center on the handling of employee records. Ohio Oil wants to program into the computers a complete background file on all of its employees. Other early uses of the computers will include speeded-up inventory and sales accounting.

The company also plans to use the computer system as an aid in scheduling the daily flow of crude and products through pipelines up to 45 days in advance of shipment.

The machines are to be installed at the company's general office in Findlay, Ohio.

'Cleavage Fracture' Causes Determined

The causes of line pipe "cleavage fracture"—heretofore a little-understood phenomenon whereby stretches of pipe rip open with stunning speed—have been largely determined through a research program under the auspices of the American Gas Assn.

Findings based on eight years of study were summarized by a battery of Batelle Memorial Institute researchers, and presented at a recent two-day AGA seminar in Dallas.

The session was conducted by the Line Pipe Research Committee, which functions under AGA's Pipeline Research Committee.

Researchers stressed that actual line pipe failures are comparatively rare, since the industry is getting good pipe—considering the many complexities involved.

Baxter D. Goodrich, senior vice-president, gas division, Texas Eastern Transmission Corp., and chairman of the Line Pipe group, underscored this point. "We have great respect for the pipe we have," he said.

Nevertheless, the research has already resulted in improved mill practices and in better inspection and field-testing techniques.

Research results demonstrated that line pipe is subject to two general types of rupturing—a shear, which is not so destructive nor so uncontrolled, and a cleavage, which produces the lengthier failures.

A shear fracture also can be unstable, but ordinarily it doesn't affect as great an area as a cleavage and is likely to produce a leak rather than a gaping rupture.

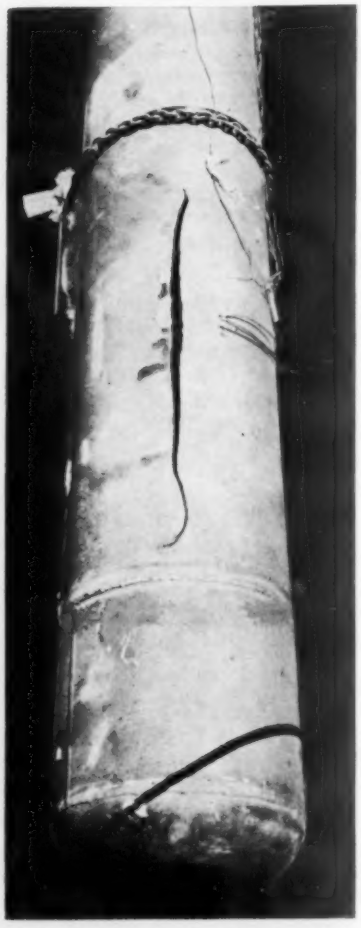
Furthermore, a cleavage failure—identifiable by unmistakable "chevron" marks along the lip of the break, pointing to its source—requires less energy and smaller pipe defects to get started.

While line pipe failures of any kind are distinctly unwelcome, the research suggests strongly that the shear type of break is less serious than the cleavage variety.

Cleavage fracture, sometimes called "brittle fracture," is not confined to pipelines; it is common to many materials and industries.

Despite the fact that it was recognized as far back as the mid-19th century, little was understood about it when the research was begun.

This Batelle investigation was devoted to finding out how such cracks start, how they behave, and how they can be eliminated.



FAILED PIPE that had been notched, pressured, and rammed to start crack.

"Crack speed" in a cleavage failure—the velocity at which the split races down the length of pipe—is fantastically fast, as high as 3,000 to 4,000 ft. per second.

This is approximately the speed of sound through steel.

Laboratory and field tests indicate that a crack first accelerates rapidly, then levels off to some terminal speed. And some of them move much faster than others, depending upon the conditions.

The researchers have pretty much pinpointed the basic reason for cleavage failures, and the way they behave, or propagate, and have identified many of the influences present. Basically, such a high-velocity split originates with a pipe defect or flaw.

The defect can be any type of weakening in the pipe wall, such as an arc burn, a notch, or a corrosion pit, etc.

The larger the defect, the more the likelihood of a rupture. But a failure requires something more than a defect.

An energy source of some kind must act on the defect to cause the cracking.

This energy source is the amount of stress in the pipe wall.

Any of several factors, or a combination of them, can increase the stress sufficiently to initiate a crack, including temperature, pressure, and the geometry of the pipe.

Experience in the laboratory and field has demonstrated that several cleavage-type cracks can occur simultaneously, which indicates that the rupture process utilizes practically all of the energy available.

This type of failure can produce a crack pattern so complex that a section of pipe can be fractured into hundreds of pieces.

The "crack speed" behavior accounts for the sudden, long lengths of pipe failure in buried lines. The head of the crack moves down the pipe so swiftly that the release of gas pressure in the line can't catch up.

Although the pressure, one of the stress-energy producing influences, is relieved as the pipe breaks apart, the crack runs along so fast that this reduction in pressure can't be "communicated" to it.

Test results indicate that all of the crack-creating energy comes from the stress in the pipe wall—that the energy of compressed gas (or liquid under pressure, for that matter) within the line has no effect in a failure except to contribute to this stress.

One question mark is why a cleavage failure, once started, ever stops.

The researchers theorize that the break may simply run into a material tough enough to halt it, or that there may be some energy change significant enough to stop it.

But the exact reasons still are obscure.

A key project in discovering some of the answers to line-pipe failure

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problems was a series of four field tests conducted under controlled conditions.

The test series, begun in 1954, was run near Athens, Ohio.

With minor variations, the physical set-up for each of the experiments involved a buried, instrumented test length of pipe, coupled to two other sections at each end.

A V-notch defect was milled into the test section to a depth of 28% of its wall thickness.

Stubs were mounted on either side of the V-notch, and a hydraulic ram mechanism was placed between them.

The pipe was then pressured with gas up to between 910 and 940 psi., and the ram actuated to start a crack.

One important conclusion: There is a direct relationship between temperature and cleavage. The lower the temperature, the greater and faster the fracturing.

This had been suspected for a long time, but the Athens tests apparently were conclusive.

One of the tests was conducted with line pipe chilled to between zero and 20F; others were performed with pipe at temperatures of 58F, 90F, and 130F.

The most spectacular fracturing occurred in the colder pipe—seven or eight cleavage ruptures, traveling at between 3,000 and 4,000 ft. per second and reaching beyond the actual test section into the attached sections at either end.

The section tested at 58F experienced four cleavage cracks, which also extended beyond the test section, and reached a velocity of about 2,600 ft. per second.

In the 90F test, a single cleavage split tried to branch into other cracks at a velocity of around 1,570 ft. per second, but didn't.

At 130F, the deliberate cracking produced only one shear-type split in a straight line along the top of the pipe, at a velocity of about 900 ft. per second.

These and other test findings confirmed the concept of "transition temperature." Simplified, this means a given type of steel is more likely to fail in a shear fracture above some point on the temperature scale—and probably will fail in a cleavage on the lower side.

This transition temperature varies among the different types and grades of steel, and is more of a band on the temperature scale than any sharply defined degree mark.

This zone depends on the state of stress in the pipe, severity of the defect, the rate of loading the pipe, the geometry of the pipe, and the metallurgical factors of the steel.

Simply thickening the pipe wall won't eliminate failures—in fact, it may actually aggravate them.

Failures occur because of the relationship between stress-energy forces and existing defects. Increasing wall thickness won't stop failures if that relationship is critical.

There is a possibility that thickening the wall can adversely affect the toughness of the steel and create a less-desirable transition temperature zone—thereby actually increasing the hazard of a cleavage condition in event of a failure.

The researchers believe it should be possible to eliminate cleavage failures by developing steel with the proper qualities—that is, steel possessing a temperature transition-range favoring shearing in case of failure.

They feel that by proper metallurgical make-up, careful processing, high quality control, and thorough inspection procedures, the right kind of transition temperature characteristics can be attained.

In fact, they say, the materials and the technology are available now to produce pipe in which it would be extremely hard for a crack to start.

Making it available for field use on an economic basis is the real problem that must be licked.

In the event of a failure, such pipe would shear, rather than cleave. The failure probably would result only in a leak or a short break—not a bursting split that could tear up many joints of pipe.

The industry still is some distance away from establishing the necessary criteria for measuring these qualities precisely.

Several recognized testing methods have been used—the longstanding Charpy test (essentially, a hammer method of breaking a notched specimen and measuring the expended energy), tear test, fatigue-crack method, bend test, drop-weight test, explosion vault, Robertson test (utilizing liquid nitrogen and heat), and others.

But, it is felt, some new approach or some new variation of older methods might be needed.

Until much more work is done, there won't be any standardized criteria established.

What's New / IN TRANSPORTATION

Two gas rate settlements—one offered by Columbia Gulf Transmission Co. and the other by Cities Service Gas Co.—have been accepted by the Federal Power Commission.

A 6.5% rate of return was approved for Columbia Gulf, instead of the 6.8% rate originally requested. The settlement necessitates a $1.6-million refund on a proposed annual rate boost of $1,970,000, put into effect—subject to refund—on May 1, 1960.

Cities Service was permitted a 6.25% rate of return, instead of the 6.75% originally requested. Refunds in its case on an annual basis will amount to about $5-million. The company had sought an increase of $10.5-million, which went into effect—subject to refund—on Nov. 23, 1959.

•

Authorization of a $37.5-million expansion program by Northern Natural Gas Co. was recommended by FPC Examiner Samuel Binder.

Northern Natural's proposed expansion would boost capacity of its system by 174-million cf/d, of which 75-million cf/d would go to Michigan Wisconsin Pipe Line Co. Binder also approved an expenditure of $6.5-million by Michigan Wisconsin for new facilities to take the gas from Northern Natural.

•

Continental Pipe Line Co. has withdrawn an application for authority to build a crude pipeline and gathering system in northeastern Wyoming.

Continental had sought permission to construct gathering facilities in the Bertha and Prairie Creek fields in Crook and Campbell Counties, and an 18-mi., 4-in. line to connect them with facilities of Belle Fourche Pipeline Co.

•

United Fuel Gas Co. has bought one of Solar Aircraft Co.'s new gas-turbine-driven centrifugal compressor units. It will install the unit at its Spencer (W. Va.) compressor station, where it will be powered by Solar's 1,100-hp. Saturn turbine.

The Market Trend

PETROLEUM WEEK

April 7, 1961

The Old Order Changed—Long Ago

If Venezuelan sellers want to dig up some bugaboos, they might land on two for special mention: Falling tanker rates and rising prices for Texas crudes.

Both of these are idols that have proved false. Fifteen years ago, tanker rates were the private preserve of the major oil companies. Today it's a harum-scarum cut-price business heavily influenced by Greek and Norwegian owners and Italian banks. Texas was once the oil export center of the world, but for years now it's been an import-protected system—on tap for world crises like Abadan and Suez if the price is right.

Look back for a moment at the situation in Qory. Venezuelan crude prices at that time were 12¢ below West Texas at seaboard (just enough to give access to the New York and Canadian markets). Venezuela then was 12¢ above the Persian Gulf. West Texas was $1.29 at Houston. Oficina was $1.17 at Puerto la Cruz. Arabian was $1.05 at Ras Tanura.

As long as ship rates held strong, Venezuela was safe in Europe and the Americas. The magic number was about 94¢ a bbl. That is, as long as tanker rates held about USMC flat or higher, Venezuelan crude could be priced a hair under Texas and up to 94¢ above Middle East, and the status—at least in North and South America—would be quo.

For 12 years, Venezuelan crude prices stayed within 12¢ of rising Texas prices at seaboard. This, in retrospect, was a mistake, for in that period—from 1946 through 1955—Texas slipped from a prime export center to a marginal one.

And over 15 years, Middle East prices lagged behind Venezuela by increasing amounts. First Arabian lagged Oficina by 12¢, f.o.b. Then, in late 1946, it was 39¢ below. By 1959, the gap was 69¢. In January, 1957, Middle East crude was about $1.00 below Venezuela. The average for the past three years has been 88¢.

Enter the Greeks bearing tankers and the game is up. Where Venezuela was a dominant pricing center at USMC flat tanker rates, it became secondary at rates down to USMC minus 50% and even minus 70%. Especially when the Middle East is posted today 90¢ a bbl. below Venezuela.

Fuel for Japan: The irony of the situation is that Venezuela may pick up a few cargoes because of low tanker rates. Japanese buyers can't find all the fuel oil they want in the Persian Gulf. They're about to come to the Caribbean, an 8,300-mi. haul.

Detroit 'Gas': American Oil copped the 5.3-million-gal. Detroit gasoline business. The company will supply 90-octane, delivered, at 10.69¢ a gal.

The Market Place

AROUND THE WORLD

Current key crude and product prices compiled for PETROLEUM WEEK by Platt's OILGRAM Price Service, a McGraw-Hill Publication.

All prices as of April 3

Bold face type indicates changes from previous week

KEY PRICES—REFINED PRODUCTS

(¢ per gal. except dollars per bbl. where $ is shown)

Western Hemisphere

U.S. Gulf Coast, cargoes
- Gasoline, 98 oct prem....11.75-13.25
- Gasoline, 92 oct reg....10.75-11.5
- Kerosine....9.875-10.75
- Heating oil, No. 2....9.25-10
- Gas oil, 48-52, d.i....9.5-9.75
- Fuel oil, bunker "C"....$2.20-2.40

Caribbean, cargoes
- Avgas, Grade 100/130....14.75
- Gasoline, 93 oct research prem....10.875
- Gasoline, 87 oct research reg....9.5
- Gasoline, 80 oct research....8.75
- Gasoline, 70-72 oct motor method....8.625
- Kerosine....9.875
- Heating oil, No. 2....8.625
- Gas oil, 48-52 d.i....8.875
- Fuel oil, bunker "C"....$2.00

New York Harbor, barges
- **Kerosine....10.95↓-11.4↓**
- **Heating oil, No. 2....9.95↓-10.4↓**
- Fuel oil, No. 6....$2.62

Okla.-Group 3, northern shpt., bulk
- **Gasoline, 91 oct reg....12.5↑-13.25**
- **Kerosine....10.95↓-11.4↓**
- **Heating oil, No. 2....9-9.25↓**
- **Fuel oil, No. 6....$1.64↓-1.90**

Chicago, bulk
- **Gasoline, 92 oct reg....11.5↓-12↓**
- **Heating oil, No. 2....9.5↓-11.85**
- Fuel oil, No. 6 high sulfur....7.65

Los Angeles, rack
- Gasoline, 88 oct reg....10.8-12.65
- Diesel fuel, PS 200....7.75-11.25
- Light fuel, PS 300....$2.90
- Heavy fuel, PS 400....$2.10-2.45

Natural Gasoline, Grade 26-70
- FOB Group 3....4.5
- FOB Breckenridge, Tex....4

LP-Gas
- Propane, Oklahoma (Group 3)....4
- Propane, Baton Rouge....4.625*

Pennsylvania Lubes
- Bright stock, 25 p.t....26
- 200 vis. neutral, 25 p.t....28

Mid-Continent Lubes, Tulsa basis
- Bright stock, solvent, 95 v.i....26-27
- Neutral solvent, 200-210 vis....23-24

Gulf Coast Lubes
- Bright stock, solvent, 95 v.i....26-27
- Neutral, solvent, 200 vis....23-24

**Effective Mar. 30.*

Eastern Hemisphere

Singapore (Pulau Bukom) cargoes
- Avgas, grade 100/130....15.5
- Gasoline, 79 oct research....9
- Kerosine....9.75
- Gas oil, 48 d.i. minimum....9

KEY PRICES—CRUDE OIL

(2¢ differential per deg. of grav. applies except as noted)

Western Hemisphere

United States (at the well)
- Mid-Continent, (Okla.-Kan.), 36.0-36.9....$2.69-2.97
- North Dakota, 36.0-36.9....2.47-2.87
- Texas:
  - Gulf Coast, low cold test, 26.0-26.9....3.50
  - Gulf Coast, Upper & Lower, 26.0-26.9....2.92-3.22
  - West Texas, sweet, 36.0-36.9....3.00
  - West Texas, N.M., inter., 36.0-36.9....2.93
  - West Texas, N.M., sour, 32.0-32.9....2.71-2.85
  - East Texas, flat....3.05-3.25
  - Mirando, 28.0-28.9....2.96-3.31
- Illinois Basin, flat....3.00
- Pennsylvania Grade, Bradford dist., flat....4.80
- California, Signal Hill, 21.0-21.9....2.33†
- North Louisiana-Arkansas, 36.0-36.9....2.72-3.02
- Wyoming, sweet, 36.0-36.9....2.85-2.90
- Wyoming, sour, 32.0-32.9....2.63-2.71

Canada (flat prices, at the well)
- Pembina (Alta.)....$2.38
- Leduc-Woodbend (Alta.)....2.53
- Redwater (Alta.)....2.42
- Steelman A (Sask.)....2.425
- Virden (Man.)....2.285

Venezuela (Cargoes, FOB lifting port designated)
- San Joaquin, 41.0-41.9, Puerto la Cruz....$3.10
- Oficina, 35.0-35.9, Puerto la Cruz....2.80
- Tia Juana, Medium, 26.0-26.9, Amuay....2.30
- Bachaquero, flat, La Salina....1.85
- Lagomar, 31.0-31.9, Cardon....2.55
- Lagunillas Heavy, flat, La Salina....2.07

†Differential per deg. of grav. varies

Eastern Hemisphere

Middle East, Persian Gulf (Cargoes, FOB lifting port)
- Arabia, 34.0-34.9, Ras Tanura....$1.80
- Safaniya, 27.0-27.9, Ras Tanura....1.47
- Iran, 34.0-34.9, Bandar Mashur....1.78
- Iran, 34.0-34.9, Abadan....1.73
- Iraq, 35.0-35.9, Fao....1.72
- Kuwait, 31.0-31.9, Mina-al-Ahmadi....1.59
- Qatar, 41.0-41.9, Umm Said....1.95
- N. Zone, Burghan, 23.5-24.4, Mina Saud....1.48
- N. Zone, Ratawi, 23.5-24.4, Mina Saud....1.41
- N. Zone, Eocene, 16.5-17.4, Mina Saud....1.28

Middle East, Eastern Mediterranean
- Arabia, 34.0-34.9, Sidon....$2.17
- Iraq, 36.0-36.9, Tripoli, Banias....2.21

North Africa, Bougie, Algeria
- Hassi Messaoud, 40 and above....$2.65

KEY TANKER RATES

(Last paid, per long ton, single voyage)

- U.S. Gulf-New York, clean....(ATRS—27½%) $2.07
- **U.S. Gulf-New York, dirty (ATRS—27½%) $2.07↓**
- NWI-USNH, dirty....(ATRS—60%) $1.10
- NWI-UK/Cont., dirty....(Scale—62½%) 12/3*
- **Per. Gulf-UK/Cont., dirty (Scale—52½%) 29/6*↓**
- Persian Gulf-USNH, dirty....(USMC—65%) $4.45

**Sterling*

Colombia Takes the Lid Off 50-50

Oil companies in Colombia will have to pay a stiffer price for oil rights under a new oil law that wipes out the 50% limit on the government's total tax take.

The law, amending Colombia's basic Petroleum Code, was signed by the president last week, with effective date yet unspecified.

Though regulations implementing it have not been completed, it is expected to affect present concessions in some degree—especially those on which commercial production has not been started—as well as all future grants.

Some existing incentives for oil investment in Colombia are cut out by the new law, in the view of some industry circles, since costs will be greatly increased along with the potential boost in the government's present 40% to 50% tax share.

Others agree the terms are severe, but concede they are likely to achieve one aim: to push faster evaluation and development of acreage held.

The law drastically hikes surface rentals, increases royalties, and reduces depletion allowances by some 10%, also limiting them to amortization of capital investments.

The new rental rates, per hectare: For the Llanos—the eastern plains, where commercial production hasn't been established—10¢ in the first exploration year, rising to $1 in the eighth; elsewhere, 20¢, climbing to $3 in the fifth year. These rates will be reduced 50% beginning in the second year if a drilling rig is kept operating 300 days of each year.

Present rates in the Llanos are 1¢ to 7½¢ but are not payable if a rig is in operation. Elsewhere they are 3¢ to 45¢, with 50% reduction in the first five years if a rig is operating.

The new royalty rates: 11½% for the Llanos, though reduced to 7% for the first ten years of commercial production; and 14½% elsewhere.

Present crude royalties are 3% in the Llanos, 10% in territorial waters, and 3% to 13% elsewhere, depending on distance to seaboard.

On depletion, the terms provide for a "normal" 10% allowance plus a "special" allowance for production started after 1954, for a total of 18% in the Llanos and 15% elsewhere. The maximum deduction from net income before depletion will be 50% in the Llanos and 45% elsewhere.

The law also slices the size of concession areas in half, reduces the maximum exploration period by five years, and increases drilling obligations.

In the Llanos, the maximum concession size will be 200,000 hectares, and elsewhere 50,000.

The exploration period in the Llanos will be an initial four years, with four one-year extensions if at least 4,000 meters is drilled each year. Elsewhere, the initial period will be three years, with three one-year extensions. Minimum drilling, not previously specified, is set at 2,000 meters for the initial exploration period.

The development period is also reduced, and relinquishment of 50% of the original concession area will be required in the first year.

For the Llanos, development rights are cut to 40 years with a 10-year extension, from 50 plus 20. Elsewhere, it will be a flat 30 years, eliminating a 10-year extension.

Concessions are specifically opened to companies in which foreign governments have "an economic interest."

This provision, requiring only a waiver to any diplomatic claim, removes the bar to entry of British Petroleum Co. under its partnership with Sinclair, which moved into Colombian exploration in 1959.

Oil Search Emphasis Shifts Eastward

U.S. oil companies of all sizes are shifting their sights in searching for foreign oil reserves outside North America, under present buyer's market conditions—and U.S. import restrictions.

The shift is one of emphasis, degree, or both. It emerges as a fairly common thread running through 1960 annual reports currently being distributed. Many of the companies ventured abroad for the first time only in the past three to four years in search of less costly crude—either for their own needs, or for sale to other buyers.

Though U.S. firms are still moving into new exploration ventures abroad, they are dropping acreage outright or reducing expenditures in areas that are comparatively less promising for commercial production for geological or marketing reasons or both.

This approach, explicitly stated by Cities Service Co., is also reflected by other cost-conscious companies. Potential profitability of foreign ventures is clearly being weighed more cautiously against a backdrop of weakened prices, the world surplus crude capacity, and heightened competition for markets outside the U.S.

With a few exceptions, ventures that companies report as either terminated or suspended are concentrated in the Americas.

- **Jordan:** Phillips Petroleum gave up its entire 8.1-million-acre concession after drilling the sixth unsuccessful test on the acreage—originally acquired in 1958 from Pauley Petroleum.
- **Ivory Coast:** Plymouth Oil Co. pulled out of a French exploration venture after participating in drilling two dry holes.
- **Italy:** Cities Service and Pan American International gave up jointly held concessions after drilling three shallow tests in the south.
- **British Guiana, Ecuador, and Peru:** Standard of California last year surrendered all its concessions.
- **Guatemala:** Atlantic Refining is pulling out after several years of exploration, including a third joint-interest dry hole drilled last year.
- **Paraguay:** Gulf Oil terminated exploration.
- **Argentina:** Union Oil Co. of California has suspended exploration after drilling nine tests without finding commercial production.
- **Costa Rica:** Union and Gulf Oil have suspended drilling under a joint agreement made in 1958 on Union's holdings.
- **Barbados, Bahamas, and British Honduras:** Gulf Oil has farmed out its interests in the first and suspended drilling in the latter two.
- **Venezuela:** Sharples Oil, Den-

ver, a newcomer to Venezuela, pulled out last year. Pure Oil, also a newcomer with other stakes there, bought its 6.22% interest in Lake Maracaibo tract Northwest V-575, a 2,000-acre block acquired in 1956-57 by a seven-company group headed by San Jacinto.

Another group of newcomers—Signal, Pure, and Sohio—suspended development drilling a year ago on Lake Maracaibo Block 4, though they plan to drill four more wells this year.

The five-company Paria Operations Inc. group is suspending operations on offshore acreage in the Gulf of Paria for which it paid over $100-million in bonuses in 1957 (PW—Jan.13'61, p46). Out of 20 tests drilled, nine were producers with limited commercial potential and have been shut in. Results were "not encouraging," but the acreage will be retained since a large part of it has not been tested. Partners are Continental, Texaco, Ohio Oil, Cities Service, and Richfield.

An associated trend is a shift in emphasis to the Eastern Hemisphere, where the proximity of faster-growing markets is attracting most of the new exploration interest.

The orientation toward markets—particularly Europe's—is illustrated by new plans made by U.S. companies for foreign refining and marketing of crude they are developing or hope to find in Africa.

For example: Continental Oil, in its first foreign retailing venture, has purchased a Munich-based marketing firm with 450 outlets in West Germany and Austria that will handle products made from its Libyan crude.

Ohio Oil, also working out plans to place its Libyan crude in Europe, proposes building a refinery in Spain. And Cities Service has purchased a ⅓ interest in an Italian marketing company with 300 retail outlets.

Elsewhere in the Eastern Hemisphere, Indiana Standard has lined up its first foreign refining-marketing venture in Australia as a prospective outlet for production it is seeking in many different countries.

Libya is getting the biggest play from U.S. firms seeking foreign production, but other African areas are also getting increased attention.

A long list of U.S. firms—besides the dozen that already have concessions in Libya—has shown interest in acquiring acreage there. Phillips, for example, has entered applications for relinquished acreage that was recently, and briefly, opened for bids (PW—Mar.24'61,p44).

Among many others interested: a six-company group headed by Sun, which reports it has done photogeologic studies to determine the "advisability" of operating in Libya. Its associates are Union, Pure, Tidewater, Ashland, and Skelly.

A total of 15 U.S. firms last year moved into the Spanish Sahara, one of the newest exploratory areas, where drilling is beginning to start.

Gulf Oil began stratigraphic testing last year, and Union spudded its first wildcat this February. The Sun-Pure-Champlin group expects to start exploratory drilling later this year.

Atlantic says it added two more permits to its original holdings during 1960 for a total of 2-million acres. Studies are in progress to determine drilling plans.

Other companies engaged in preliminary work are: Richfield and Cities Service, Sohio and Tidewater, Pan American International, Phillips, the two Caltex parents, and General American Oil Co. of Texas. Some of these companies acquired acreage in mainland Spain as well.

Gulf Oil was the only one that also moved into Spanish Guinea under Spain's new oil law last year.

Oil-producing Nigeria is attracting more U.S. firms, though Mobil is giving up on acreage it now holds.

Tennessee Gas Transmission, in its first African move, acquired a 1.3-million-acre license last year and expects another contiguous 960,000-acre license this year.

Gulf Oil, another newcomer, is negotiating for licenses both on and offshore, and the Caltex parents also have applications pending on offshore acreage (PW—Dec.2'60,p59).

In other African areas, acreage is being increased and drilling plans stepped up, though there were few new entrants last year.

• **French Sahara:** The Caltex parents moved in for the first time.

Cities Service added more acreage to the holdings now being drilled with its French associates.

And Phillips reports drilling will be increased in 1961 as a result of geophysical work carried out on all permits in which it has an interest. Results last year included discovery of three gas-condensate fields.

• **Somali Republic:** The Sinclair-Conorada group added 9.4-million acres to its 42-million-acre concession, extending it to the Kenya border. It recently encountered the first oil and gas shows in its sixth wildcat.

• **Tunisia:** The Conorada group will add 300,000 acres to present holdings. Husky Oil, Cody, Wyo., also

Cities Service Finds Oil in Sahara

Cities Service has what appears to be a significant discovery in the Algerian Sahara—the company's first in the area.

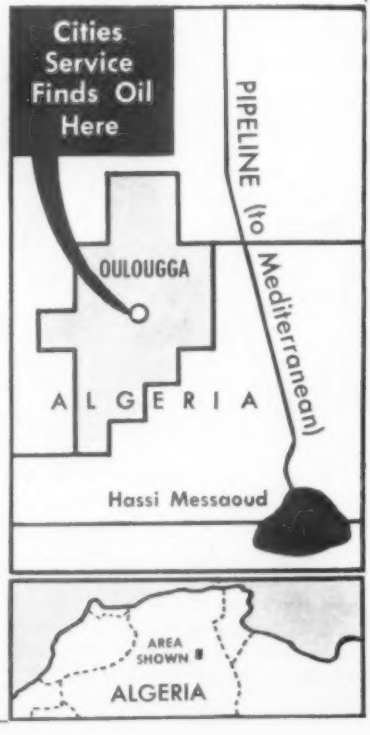
A Cities Service subsidiary, Afropec, holds a 49% interest in the Oulougga Permit (map), on which the find was made. The remaining shares are held by two French firms, Prepa (33.5%) and Francarep (17.5%). Afropec is operator on the permit.

A wildcat, Cities Service's second in the Sahara, last week produced 66 bbl. of 40-gravity crude on 61-minute drill stem test from 12,608-25 ft.

The test produced no water, indicating there was still pay section beneath the 12,625-ft. level.

A second test of section down to 12,646 ft. was being prepared last week.

The discovery has added interest because it is only 20 mi. from the 24-in. Hassi Messaoud pipeline, which connects Algerian Sahara's largest oil field with the Mediterranean port of Bougie.



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will get new acreage to be added to that already operated by Rimrock Tidelands, an affiliate.

• **Senegal:** Cities Service and Continental will participate in drilling the first test well this year under a joint venture pact made in 1959 with SAP, a French government-controlled operator. Each holds a 24%-25% interest in SAP's permits in Senegal and in Mauritania.

• **Mozambique:** Drilling is slated to start in the second half of 1961 under the joint venture agreement made in 1958 by Gulf Oil and Pan American International on a 29-million-acre concession.

• **Cabinda:** Gulf Oil drilled over 100,000 ft. of stratigraphic tests last year in this tiny Portuguese territory, it reports. Several of the deeper ones had showings of oil.

Elsewhere in the Eastern Hemisphere, Australia drew some new activity from U.S. firms, more than 20 of which—including many independents—already have extensive acreage interests there.

The Conorada group, for example, is more than doubling its acreage interests in Queensland with a 6-million-acre farmout in which it will have a 75% interest. It drilled its first stratigraphic test last year.

Union Oil, with Kern County Land Co. of California and an Australian partner, spudded its first wildcat in the Surat Basin late last year and is drilling ahead after encouraging shows of gas and condensate below 9,900 ft.

Phillips and Sunray Mid-Continent, which have an Australian partner on jointly-held acreage in Queensland, report preparations to start drilling this year.

One new drilling venture has also been started in Pakistan—by Sun Oil. It is drilling its initial wildcat, with Superior taking a minority interest in its first move into the Far East (PW—Nov.4'60,p40). Tidewater also expects to start drilling this year.

In the Western Hemisphere, the only entirely new venture was lined up early this year in offshore Trinidad by a three-company group—Pan American International, Sun, and Pure (PW—Jan.20'61,p47). The grant, on which work is slated to start now, covers 2-million acres off Trinidad's east and southeast coasts.

Pan American last year also moved into Colombia for the first time, but in this instance under arrangements to acquire an interest in existing rights. Cities Service also got a toe-hold in Argentine producing operations by acquiring a 50% interest in a secondary recovery project of a local producer.

What's New / AROUND THE WORLD

EL SALVADOR—Jersey Standard and the Shell group last week proposed to the government the merger of their separate refining plans into a single project. Shell has started preliminary work on a 10,000 b/d refinery at Acajutla. Permission had been given to Jersey to build a similar size plant in the same area.

•

JORDAN—The Italian state-owned ENI group has offered to take the exploration concessions recently relinquished by Phillips Petroleum, an Economy Ministry spokesman said last week. Phillips pulled out of Jordan after a sixth dry wildcat. It had acquired the acreage from Pauley Petroleum in 1958.

•

WEST GERMANY—Capacity of Esso's projected refinery at Ingolstadt has been set at 40,000 b/d. The Bavarian plant, to cost between $37-million and $50-million, will go on stream in 1964.

•

TURKEY—Shell has completed a second oil well—a 300 b/d producer—on its Kayakoy structure in southeastern Turkey.

The new well, the No. 3 Kayakoy, produced 38-gravity oil on tests. It is ½ mi. northwest of the discovery. The company has spudded another stepout 1 mi. east of the discovery.

•

CUBA—Cuba's product output potential was reduced to less than half of demand last week by the shutdown of the second of the big three Cuban refineries, the former Shell plant at Havana, because of "technical difficulties." Texaco's former Santiago refinery has been offstream since it was shelled three weeks ago by insurgents. Cuba, with demand of 67,000 b/d, had just two plants, with capacity of 31,000 b/d, in operation last week.

•

JAPAN—Gulf Oil has lent $30-million to one of its major Japanese customers, Idemitsu Kosan, at from 4% to 5% interest, the Japanese company said last week. Another $20-million loan came from the Bank of America. The money will be used to build two 130,000-ton tankers and for refining and petrochemical equipment.

•

YEMEN—Texas independent John W. Mecom has undertaken to assist Yemen with certain non-oil enterprises, in addition to exploring for oil under his new 50-50 profit-sharing concession agreement with the government (PW—Mar.3'61,p12). With others, Mecom will develop salt mines. He also is interested in bringing a cotton mill into the Red Sea kingdom, and has agreed to train 15 Yemeni students in Texas over a period of years.

•

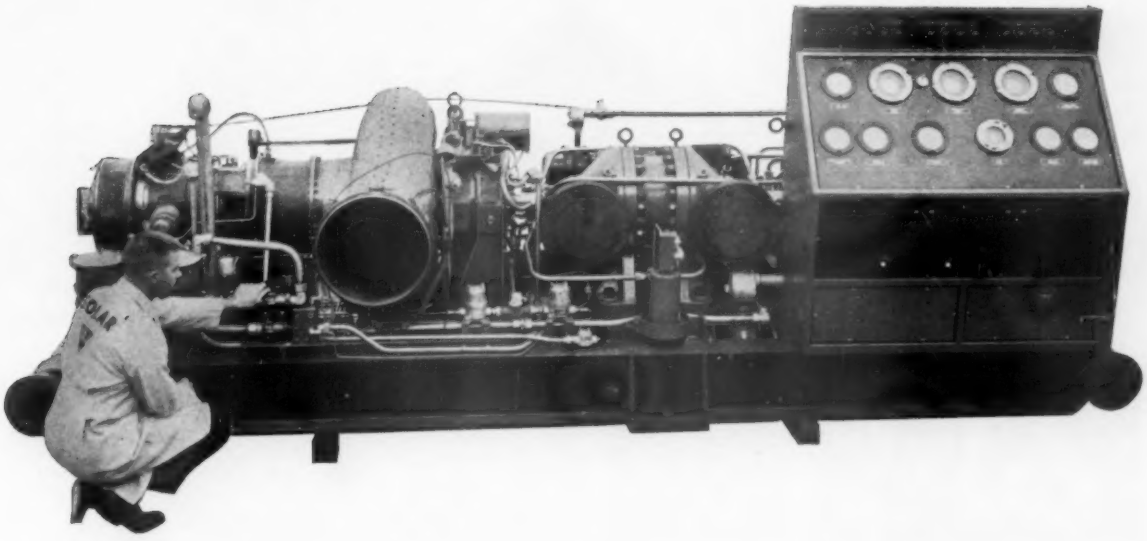
JAPAN—A policy on prices for imports of Japanese-owned Persian Gulf crude is being hammered out this week in Tokyo. A delegation representing all refiners in Japan is pressing for discounts in negotiations with Arabian Oil, the Neutral Zone producer, which has been insisting on posted prices. The government, meanwhile, has advised refiners that those who do not take a share of the crude will have their foreign exchange allocations cut.

•

QATAR—Shell may have confirmed discovery of the Arabian Gulf's newest offshore field, east of Qatar. It has again encountered oil, in the No. 3 test drilled on the Idd El Sharqi structure, where it had its first shows last summer in No. 2. Shell has given no indication of test results so far but has now spudded No. 4 to continue evaluation of the commercial prospects.

•

SYRIA—The public will be offered 25% of the shares in the new General Petroleum Co. of the Syrian Region, United Arab Republic. The rest will be held by the government. Egypt's counterpart firm is entirely government-owned. The Syrian GPC will market product from the Homs Refinery, and will undertake development of oil fields. It will probably join Deutsche Erdoel, a West German firm, on its licenses.



New Solar gas turbine compressor offers low cost, reliability, easy maintenance

A FUNDAMENTAL ADVANCE in the centrifugal compressor field is available in Solar's new gas-turbine-driven compressor line. These units are particularly adapted for gas compression (both field and main pipeline) and for general industrial use in the low volume range up to 1500 psi.

Long-life gas turbine engines, with rotating speeds of 15,000 to 30,000 rpm, made this breakthrough possible. Driving the compressor directly at turbine speeds has permitted the design of small, high efficiency centrifugal compressors that operate in the range from 75 to 1500 cfm or 5 to 150 MM SCFD.

Features of these compressor packages include: Interchangeable compressor rotors and other parts that allow fast, low cost field changes to meet new flow and pressure requirements. Designed to start and stop in seconds, even by remote control, they are ideal for unattended operation. Small and lightweight, they are easily moved and installed on inexpensive foundations. Maintenance is unusually simple.

Detailed information on Solar centrifugal gas turbine compressors is available. Write to Dept. H-225, Solar Aircraft Company, San Diego 12, California.

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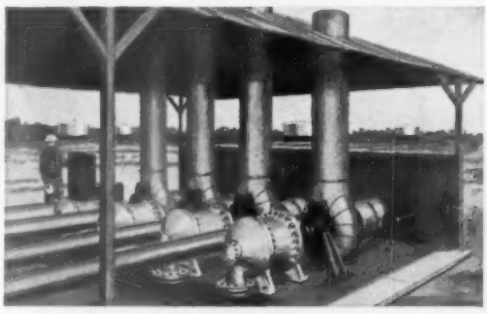

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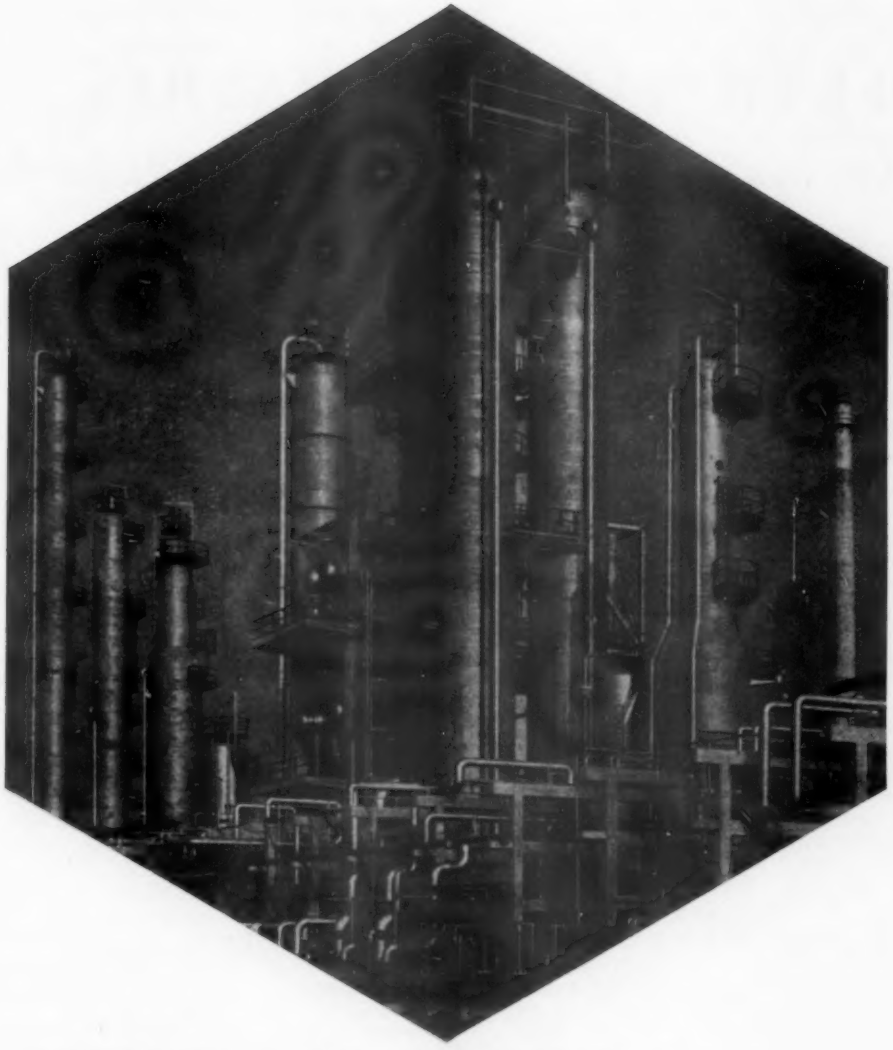

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Udex provides ideal market flexibility by enabling refiners to make products that meet changing product demands. Low utility consumption and low solvent costs make Udex unusually economical to operate.

Udex has operational flexibilities too. Feed to a Udex unit can vary widely in both quantity and composition, yet the stringent specifications of the product output will be maintained. Originated by Dow Chemical Company, the Udex extraction process was developed and is made commercially available by UOP.

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EVOLUTIONARY OPERATION:

A tool to optimize a process without disturbing it

A new technique to improve production without disturbing operations is being adopted in more and more processing plants, particularly in the petrochemical industry. It is called evolutionary operation. (EvOp).

Evolutionary operation was conceived a few years ago by Dr. G. E. P. Box, of Princeton University. It was first put into practice in 1958, in the Pensacola (Fla.) plant of Chemstrand Corp., but little was said about it for the next two years.

How much its application has spread in the industry, and how popular it has become with production and technical service engineers was revealed last week at a symposium on evolutionary operation, during the St. Louis meeting of the American Chemical Society. Companies such as Dow Chemical Co., E. I. du Pont de Nemours & Co., Monsanto Chemical Co. and its Chemstrand division, and Tennessee Eastman Co. reported on the application of EvOp in one or several of their plants.

Evolutionary operation is based on the theory of natural evolution: A small, almost unnoticeable change in a process may bring about an improvement; if it does, the change is slowly intensified up to where an optimum condition is reached; if it does not, initial conditions are re-established before any harm is done.

In nature, according to Box, improvements in living creatures are accomplished in two ways: by mutation, which is a sudden significant change; and by evolution, which is a slow, gradual change. The same procedure can be applied to industrial processes, Box said.

Mutation occurs when a radical change is tried out and found satisfactory—for example, when a new type of catalyst is used in a reaction, or when air is used, instead of oxygen.

Evolution, on the other hand, occurs when one of the existing factors —temperature, flow rate, pressure, time of contact, or concentration— is changed very slightly, and a slight improvement is noticed. In evolutionary operation, the process of natural evolution is simply accelerated and applied systematically. Small changes are carefully introduced into the operation of a unit, the effects— good or bad—are recorded, and more changes are made in the right direction.

Evolutionary operation takes the position that a process must not only produce material, but information as well.

"It is completely inefficient and outmoded," Andrew W. Williams, manufacturing manager of Chemstrand Corp.'s 114-million-lb.-per-year nylon plant at Pensacola, said at the symposium, "to operate a plant so as to 'produce product.' It must be operated also so as to produce information on how to better the product."

"EvOp," he added, "is like a mathematical filter, that screens out the interferences in the operation of a process, and gives you a clear signal."

That information is then used to

How to Carry Out an EvOp Program

THE selection of the correct variables and the details of an EvOp program can be illustrated by one of the Tennessee Eastman cases.

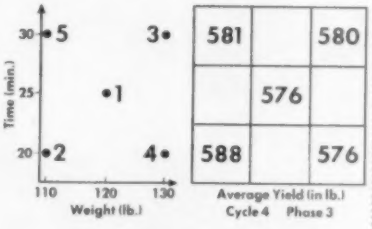
In this case, a chemical was added to a batch process, and the resulting reaction produced the desired material—but in addition, it produced an acid. The presence of the acid was necessary for a given length of time; then it had to be neutralized. The two factors selected were: (1) the weight of the chemical added; and (2) the time of exposure to the acid.

Every time a significant change was made on one of these two factors, a new "phase" was started; in each phase, many batches were run with minor differences in these two factors, so as to obtain a representative picture of all conditions; each batch is referred to as a "cycle" in that phase.

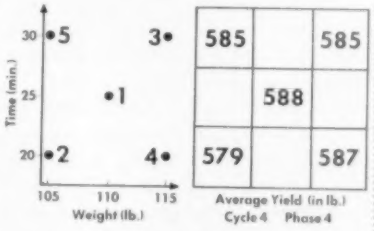
After four phases, the average yield per batch had been raised from 558 lb. to 588 lb., with a resultant saving of $25,000 a year.

During the program, the weight of the chemical, which initially was 120 lb., was changed in small increments of no more than 5 lb. The optimum weight was found to be 110 lb. The time of exposure to the acid, which initially was 75 minutes, was reduced by small increments to 25 minutes, for optimum yield.

Here's how the final stages of that EvOp study worked out in practice (the diagrams are approximations of data actually shown on the information board):



Optimum conditions determined by phase 2, represented by point 1 (left), result in a certain yield (576 lb.) used as reference center point (right) on the information board. Points 2, 3, 4, and 5 represent small changes in the variables of the process. They result in various yields. Each set of conditions is repeated many times, until a significant improvement in yield (to 588 lb.) is noted (point 2). Then the next phase is started, using the conditions that produced this improved yield as the central point, and the process of slightly changing conditions is repeated:



When no further improvement in the yield is produced regardless of the direction of the changes, an optimum is reached, and the program is completed.

improve the process in a continuous way. Several types of improvements can be obtained by EvOp application. They are essentially:

- A greater yield of finished product;
- A lower operating cost for equal yield;
- A better product, with less off-specification material.

"EvOp," said Ralph E. DeBusk of the Kingsport (Tenn.) plant of Tennessee Eastman, "has been effectively applied in over 15 processes in our company, batch processes as well as continuous operation. It has resulted in a substantial cost reduction."

The use of EvOp is not in the least restricted to the processing industries. "It's usefulness is [also] beginning to be recognized in the mechanical industries," said Monsanto's Harvey Barnett.

There are two essential requirements for the application of EvOp: The changes must be made on meaningful process variables; and they must be big enough to be effective, but not so big as to cause disaster if inappropriate.

Two or three variable factors can be selected, on which small, gradual, simultaneous changes will be made. The selection must be made by people thoroughly familiar with the process and its economics.

Frequently an EvOp committee is set up to make the basic decisions for the application of the technique. It consists of people from manufacturing, process improvement, and quality control.

The information obtained as a result of the changes must be accessible to all those who participate in the EvOp program. It must be dramatically presented to sustain their interest, all speakers pointed out.

Information boards, of one form or another, appear to be the rule in every plant where EvOp is used. At Chemstrand's Pensacola plant, these boards consist of cubes mounted on a stand. On each corner of the cube, and at the center, there is a place on which to write the conditions of the test that is going on, and the results observed.

"These cubes, which we call our 'Sputniks,'" Williams explained, "resulted in a tremendous interest, not only on the part of operators who were working on the process, but also on the part of management."

The correct interpretation of EvOp merely calls for the application of elementary principles of statistics.

"Evolutionary operation," said Monsanto's R. C. Manring, "is a statistical technique for process improvement or optimization, run in the course of normal plant operation by plant personnel. It is based on the interpretation of average results, observed in a process repeated many times."

"EvOp includes a calculation of uncertainty," said DeBusk. "It shows the probability that a decision to adopt a new set of conditions is in the right direction."

It is therefore advisable in order to obtain full benefit from the application of EvOp, Barnett feels, to conduct a certain amount of in-plant training. Typically, this includes a description of EvOp, some fundamental statistical theory, and the use of a process analog, on which hypothetical problems can be worked out.

The application of EvOp does not call for additional personnel, and requires very little of the time of the existing force.

Actually the entire manufacturing force participates in EvOp, and there are no lengthy computations that require extra personnel.

Williams estimates that each EvOp program at Chemstrand takes approximately 30 minutes of manpower per day per program. This consists mostly of someone from the EvOp committee collecting the data from the information boards, and requesting from the manufacturing supervisor approval to put into effect changes that have demonstrated their advantages.

How Sun Makes Extra-Pure Propylene

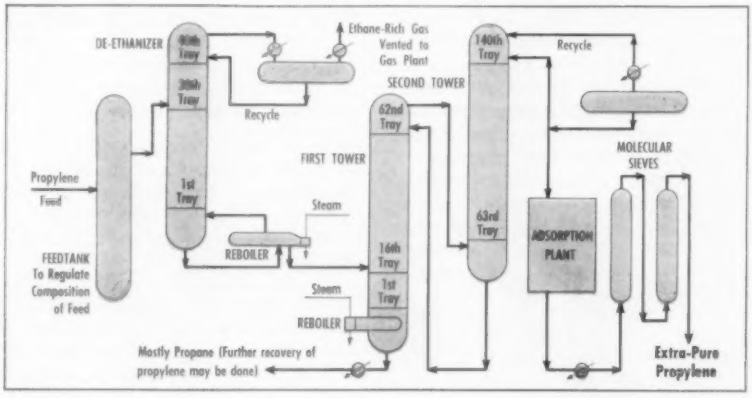
Producers of polypropylene have, historically, jealously guarded the secret of how they purify their propylene. Now Sun Oil Co. has given the industry a glimpse of the method it uses to purify propylene at Marcus Hook, Pa., before supplying it to the polypropylene plant of AviSun Corp.

Purification of propylene to a purity well above 99% is essential to satisfactory polymerization. Each manufacturer has a method of his own, but none has ever been willing to say much about it. They feel that this is one of the trade secrets that gives each manufacturer a possible edge over competitors.

At the recent meeting of the American Chemical Society in St. Louis, James A. Andersen, of Sun, described the broad lines of the method his company is using to make its extra-pure propylene.

Sun then delivers it to AviSun, the polypropylene manufacturer owned jointly by Sun and American Viscose Corp.

The purification plant has now been in operation a little more than a year.



The process Sun uses starts with superfractionation, which is performed in what is called a "splitter unit."

That unit has an ultimate capacity of 120-million lb. of pure propylene per year. A minimum purity of 99.1% was specified for its design.

The splitter unit (diagram) consists of a feed tank, a de-ethanizer, and a superfractionation tower in two sections, followed by treating and drying facilities. Propylene-rich feedstock comes from cracking operations; it is basically a mixture of propane and propylene, containing small amounts of ethane, butane, water, and acids. The bulk of the acids are removed

before the feedstock reaches the feed tank.

The heart of the process lies in a combination of extraction and adsorption, to remove the balance of the acidic impurities.

Andersen did not reveal many details of the combination. But he indicated that CO_2 and H_2S were removed with a caustic solution—which also removes part of the carbonyl sulfide (COS). The balance of the COS is removed with monomethanolamine. A further adsorption, using a solid chemical, whose identity Sun did not disclose, completes the purification.

Final drying is accomplished in a battery of molecular sieves (PW—Jun. 26'59,p34). The sieves are regenerated with hot natural gas. Care must be taken to avoid contamination of the propylene by CO_2 from the gas that may become adsorbed onto the sieves during regeneration. "Fortunately," Andersen said, "regenerations are infrequent, so that the cost of reprocessing the product is small."

The primary operating cost of purifying propylene is for steam, Andersen indicated.

Steam cost is a function of three main variables: feed characteristic, purity desired, and yield. Above 99.6% purity, steam requirements increase sharply, Anderson reported. They also increase substantially when a greater yield of propylene is desired, or when there is less propylene in the feed.

A propylene of 99.7% to 99.9% purity is being obtained in sustained operation.

The reactive impurities left in the effluent gas total less than 20 parts per million. The nonreactive ingredients are 0.1% to 0.3% of propane and about 50 ppm. of ethane. There are no other hydrocarbons and no carbon monoxide present in the effluent. Water is around 10 ppm., CO_2, COS, sulfur, and oxygen range from 1 to 4 ppm. each.

The unit is completely automatic, with conventional pneumatic controls.

Two chromatographs and a moisture analyzer on the final product are important instruments, Andersen explained. One of the chromatographs was developed and built in Sun's applied physics laboratory. Every five minutes it analyzes either the feed or the bottoms of the splitter; the operator can select either stream through a switch. The other chromatograph is a commercial unit. It checks the purity of the effluent propylene every 10 minutes, and can detect propane concentrations as low as 100 ppm.

Once the response characteristics of every part of the unit have been fully defined, Sun anticipates that it will lend itself easily to computer control.

Fuel Filter Specs Made Mandatory

A meaningful specification for filter-separators has been badly needed, because of the growing importance of obtaining absolute cleanliness in jet fuels. Performance Specification MIL-F-8901 has just been made mandatory by the Armed Forces to answer that purpose.

Apparatus used for the cleaning of jet fuels are called filter-separators because their purpose is twofold: The filter stage is intended to remove most solid particles, while the separator stage takes out of the fuel any coalesced or free water. These two stages are frequently combined in commercial units.

The necessity for a better specification for the selection of filters had been recognized for a long time. Specification MIL-F-8508, promulgated in 1956, was considered inadequate, particularly because the dust used for the tests was not typical of service, the analytical techniques were not sufficiently definitive, and the fluid used for the tests was not adequately defined and controlled.

The Defense Dept. set up a subcommittee two years ago to work on filter-separators. The group, headed by D. N. Harris, chief aviation engineer of Shell Oil Co., included representatives from oil companies and from equipment manufacturers.

A filter-separator specification is particularly important because the cleanliness of the fuel is not a specification of the fuel purchased.

A consumer—a commercial airline for example—does not purchase a fuel with a determined contamination level. But it may specify to the supplier that the fuel purchased should be delivered through equipment having certain performance requirements.

The new specification will not apply to filters for jet fuels only: It is intended to cover filtering equipment for every sort of liquid fuel.

The test methods are definitive and relatively precise, Harris told PETROLEUM WEEK. The dust- and moisture-removal performance are clearly specified. By changing the flow rate and the performance severity, the same method can be applied to any liquid.

Correct Insulation

Using exactly the right thickness of insulation on heat-carrying piping can save processors up to $2 per ft. of piping per year.

This saving results not only from reduced heat loss, but also from reduced size of pipes and equipment.

From 30% to 60% of construction cost in a processing plant go into thermal insulation of pipes that carry steam or other hot liquids or gases. Yet, up to now, there has been no simple straightforward method for the optimum design of insulation.

Union Carbide Chemicals Co. and West Virginia University have developed a new method for the rapid calculation of economic insulation thicknesses.

Economic thickness of an insulation is defined as the thickness that will save the greatest cost of energy, while paying for itself in the shortest period of time.

Most piping that operates at very high temperatures is overinsulated, UCC found, while that operating at medium temperatures is usually underinsulated.

Piping operating at temperatures up to 700F comprises about 85% of the total in the industry; it is generally underinsulated by 30% to 50%. Piping operating at temperatures above 700F has been regularly overinsulated, according to UCC.

For example, an 8-in. pipe carrying steam at 450F should be covered with 2½-in. insulation. If it is covered with 2-in. insulation instead, the loss may be as high as $1.40 per ft. per year, depending on its location, the ambient temperature, and the type of insulation selected.

In refineries and petrochemical plants, the savings predicted by the application of the new method may amount to millions of dollars every year, M. W. Burleson, vice-president of the National Insulation Manufacturers Assn., told PETROLEUM WEEK.

Basic equations for the calculation of economic thickness of insulation were worked out as far back as 1926, but they were much too difficult to apply.

The American Society of Mechanical Engineers in 1926 published such equations, as worked out by L. B. McMillan, an engineer in the employ of Johns-Manville Sales Corp.

But, according to Frank C. Comerford, manager for engineering services of UCC, "applying these equations to obtain economic thicknesses for hundreds of pipes would definitely

May Save Millions

not be an economical use of skilled personnel. About 273,000 combinations would have to be worked out and presented. To accomplish this on our fastest electric calculators would take 500 man-years; and 1,052 pages would be required to present the information."

The development of the electronic computer has made it possible to apply these equations for the preparation of the tables used in the new method.

In June, 1959, UCC entered into a joint contract with West Virginia University Engineering Experiment Station. One year later, after 83 hours of computer time—an IBM 650 was used—a 182-page manual was completed. It has now been made available to the National Insulation Manufacturers Assn. and to the industry. Thus, it will no longer be necessary to depend on inaccurate empirical formulas.

What's New / IN PROCESSING

A catalytic reforming unit and facilities for catalytic hydrogen treatment of distillates will be built at Phillips Petroleum Co.'s Great Falls (Mont.) refinery this summer. They are part of an expansion program there that will also increase crude capacity and expand the water cooling system.

The new construction will allow the refinery to meet the increasing demand for high-octane motor fuel and high-quality heating oils in that area, Phillips says.

•

Trimethylene glycol, derived from acrolein, may eventually replace or supplement other esterification products in the making of unsaturated polyester resins, according to Shell Development Co.

Unsaturated polyesters are prepared by the reaction of a polyol, such as methylene, ethylene, or propylene glycol, or glycerine, on a dibasic acid such as maleic or phthalic anhydride, or isophtalic acid (PW—Feb.17'61, p34). The polyesters are then dissolved in styrene to make casting resins.

At a recent meeting of the American Chemical Society, Shell reported that TMG speeds up reaction, and gives the resins better resistance to ultraviolet rays, better compression and impact strength, and higher dielectric properties.

•

Mobil Chemical Co. has purchased 544 acres of land in the Sabine Neches area of Texas, one of the growing chemical centers in the United States.

E. H. Peters, manager of southwest manufacturing for the petroleum chemicals division, says the property was bought under Mobil's long-range program of land acquisition for possible future use.

•

Southwestern Engineering Co. has been awarded a contract for a 5,000 b/d fluid catalytic cracking unit at Murphy Corp.'s Superior (Wis.) refinery. The contract also covers other improvements at the plant. The new facilities are slated to go on stream Dec. 1.

•

Now that Celanese Corp. of America has overcome dyeing and finishing problems connected with its nytril fiber, it will manufacture and market the fiber in Europe, in addition to its nytril operations in the United States.

Celanese acquired world rights to the fiber over a year ago, and has been working to improve it since then.

The company recently entered into a joint venture with a German company that will convert its acetic acid and vinyl acetate into intermediates to be used as raw materials for nytril fiber. A jointly owned company will begin to manufacture the fiber at new facilities in Bavaria during 1962.

•

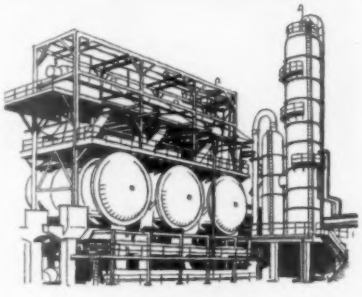
A reduction in the price of antiknock compound for aviation mix has been announced by the manufacturers, Ethyl Corp. and E. I. du Pont de Nemours & Co.

The new price will be 62.54¢ per lb. of tetraethyl lead content, or 2.09¢ below the former price. On a liquid weight basis, the price will now be 38.406¢ per lb.

Ethyl's change was made effective Mar. 30, Du Pont's Mar. 31.

on stream in Italy

another
HOUDRY DEHYDRO PLANT



ANIC
Ravenna, Italy

This new installation is the first dehydrogenation plant built in Italy. It has a design capacity of 20,000 ton/yr of butadiene from butane. Houdry Dehydrogenation Catalyst is used in the reactors.

The Houdry Dehydrogenation Process offers simplicity as well as versatility. Only one processing step is required to produce butadiene from a normal butane feed. If desired, it can be quickly and easily adapted to production of butene and other mono- and diolefins from corresponding hydrocarbon feed stocks.

In addition to ANIC in Italy, there are eight other Houdry dehydrogenation plants serving industry in Japan, Germany, and the U. S. Complete process description available on request.

*
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**Houdry means Progress . . . through Catalysis*

JOHN G. YEAGER is the new manager of the crude oil department of Humble Oil & Refining Co.'s Humble Division, with offices in Houston. He succeeds **J. C. Postgate,** who has been appointed manager of the Midland area of Humble Oil's new Southwest region. Yeager, who joined Humble over 25 years ago, became superintendent of its eastern division, in New Orleans, in 1949, and was promoted to assistant division superintendent there in 1955, a position he has continued to hold with the new Humble company up to the present time.

J. G. Yeager

M. H. Dubrow

M. H. DUBROW has been promoted to manager of production for Continental Oil Co., with offices in Houston. He was formerly assistant manager of Conoco's production department there. Dubrow joined Conoco in 1936, and became petroleum engineer for Conoco's southwestern region, at Ft. Worth, in 1943. He was promoted to chief petroleum engineer at Ponca City, Okla., in 1947, and moved his offices to Houston in 1950. He has been assistant manager of the production department since 1959.

W. P. GRANT has been appointed marine superintendent in New York for Gulf Oil Corp. He was formerly marine district manager in Philadelphia.

DONALD R. NELSON has been appointed manager of marketing of the Republic division of Plymouth Oil Co., Pittsburgh. He was formerly general manager of marketing for Leonard Refineries, Inc.

J. T. CROOKER has been appointed manager of the southern division for the producing department of Standard Oil Co. of California-Western Operations, Inc., with headquarters in La Habra, Calif. He was formerly district superintendent at Anchorage, Alaska, for the department.

J. F. HENDRICKSON, Phillips Petroleum Co., Houston, has been elected chairman of the southern district of API's division of production. He has served as program chairman for the district, which held its annual meeting in Shreveport, La., last month. **Leonard Leon,** Halliburton Co., Houston, was elected southern district secretary-treasurer, and **Jack Robbins,** Skinner Corp., San Antonia, was elected chairman of its advisory committee.

F. J. Stephens

D. H. Barran

D. H. BARRAN has been appointed to the board of Shell Transport & Trading Co., Ltd., and will become managing director of the Royal Dutch Shell group of companies, succeeding **F. J. STEPHENS,** who becomes chairman of Shell Transport & Trading. Stephens will succeed **Lord Godber,** who is retiring. Barran has been president of Asiatic Petroleum Corp. and Shell Caribbean Petroleum Co., affiliates of the group in New York, since 1958. **H. Wilkinson,** a former president of Asiatic and Shell Caribbean, who is a group managing director, has been appointed a managing director of Shell Transport & Trading.

E. J. KARLE has been elected vice-president of California Oil Co., Eastern Division, Perth Amboy, N. J., subsidiary of Standard Oil Co. of California. He succeeds **C. E. Allen,** who is retiring. Karle, who has been assigned to Caloil since 1949, is currently manager of the refining department at Perth Amboy. He was an engineer for California Standard at its Richmond (Calif.) refinery, before moving to the East Coast. As part of his assignment, Karle will assume the duties of general manager of Caloil's refining department, with headquarters at Perth Amboy.

E. J. Karle

D. G. Van Tilburg

DONALD G. VAN TILBURG is the new manager of Socony Mobil Oil Co.'s process promotion department in New York. He succeeds **James P. Shambaugh,** who has joined Mobil Petroleum Co., a Mobil operating division. The process promotion department licenses manufacturing processes developed by Mobil, and handles sales of catalysts manufactured by the company. Van Tilburg was formerly manager of Mobil International Oil Co.'s refinery at El Palito, Venezuela, where he supervised operations that put the refinery on stream in 1959.

C. R. SMITH is the new production division manager for Cities Service Petroleum Co., Bartlesville, Okla., succeeding **J. A. Cleverley,** who is retiring as vice-president and manager of production. Smith has been serving as general superintendent of production. **J. P. Straight,** formerly one of two assistant general production superintendents, will be the new general superintendent. **Don Kastner** is the other assistant superintendent, and **J. C. McClure** succeeds Straight. **C. J. Russell** succeeds McClure as chief petroleum engineer in the production division.

C. R. Smith

W. L. Theisen

W. L. THEISEN, sales manager of Golden Eagle Refining Co., Los Angeles, for the past two years, has been named a vice-president. Before joining Golden Eagle, Theisen had 15 years experience with two major oil companies.

W. H. HUDSON has been named president, general manager, and a director of Stekoll Petroleum Corp., Dallas. Hudson was formerly president of Three States Natural Gas Co., Dallas, which was recently merged into Delhi-Taylor Oil Corp., and also had his own producing firm, W. H. Hudson Co. **Joseph Avant** is Stekoll's new general operations manager, and **James Barnett** is its new chief fiscal officer. Avant and Barnett were associated with W. H. Hudson Co.

RICHARD W. FETZNER, research geologist, Sun Oil Co., Richardson, Tex., will receive the President's award of the American Assn. of Petroleum Geologists, at its annual meeting at Denver this month. Each year the President's award is given to an author under the age of 35, whose article in the AAPG Bulletin of the preceding year is considered "the most significant contribution to petroleum geology." Fetzner's award-winning article, Pennsylvanian Tectonics of the Colorado Plateau, appeared in the August, 1960, Bulletin.

H. E. CHRISTENSEN has been named assistant to the general manager of the domestic producing department of Texaco Inc., with offices in Houston. Christensen, who has been with Texaco since 1928, became assistant manager of the Denver division, domestic producing department, in 1953, and was most recently vice-president in charge of exploration for Texas-Zinc Mineral Corp., a Texaco affiliate.

PETROLEUM WEEK'S Fingertip Figures

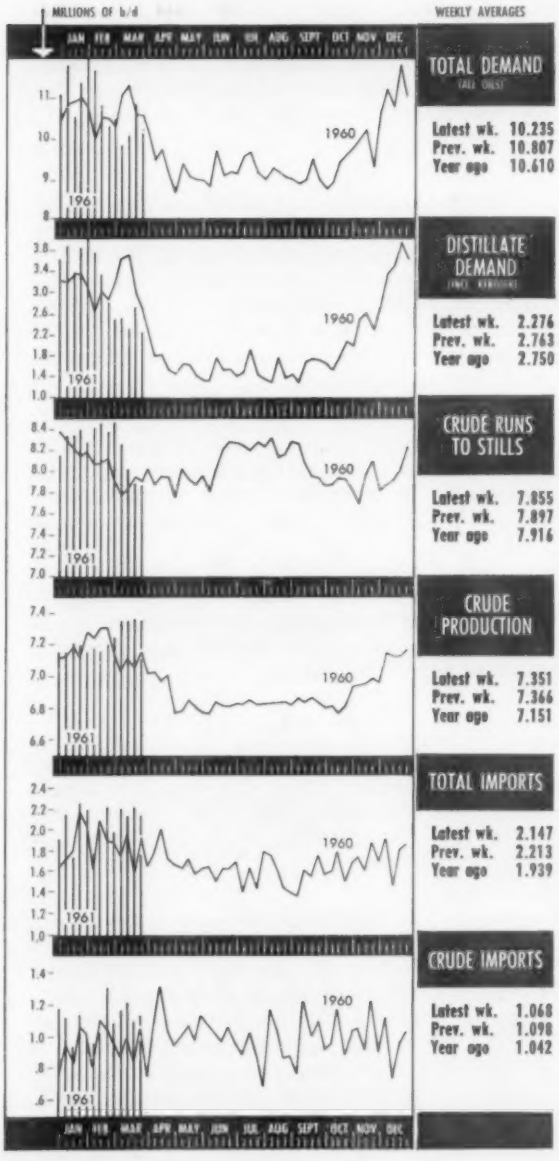
A warmer-than-normal March brought total demand for the first quarter skidding 1.1% under last year. Demand for all oils during the first three months averaged 10,682,000 b/d, down 118,000 b/d from the like period a year ago. Demand for distillates was off 3.0%—through February it had run 11.6% above the comparable period of 1960. Residual oil demand is still lagging, due to the slowdown in industry generally. Through the first quarter, demand for resid ran 8.7% under a year ago.

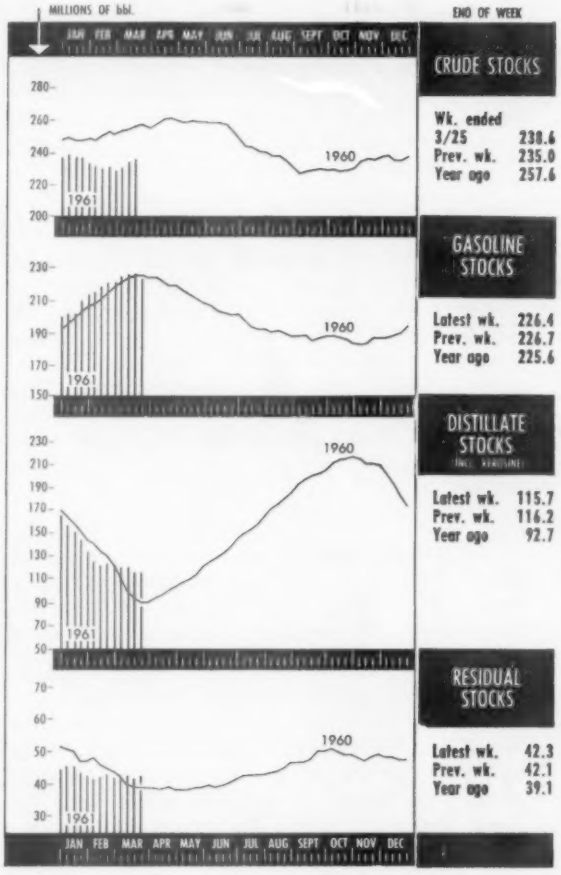
But gasoline demand set a record for any first quarter. Demand for motor fuel averaged 3,836,000 b/d, an increase of 1.5% over a year earlier.

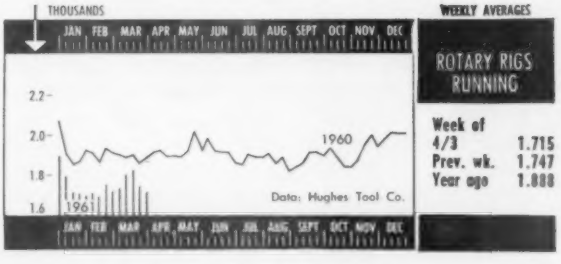
March gasoline demand, at 3,988,000 b/d, also was the highest for any March.

Gasoline stocks at the end of the month totaled 226.4-million bbl., 3.7-million bbl. above last year. Inventories during the first quarter increased 31.6-million bbl., compared with a 33.7-million bbl. rise over the same period a year ago.

All figures below are for the week ended Mar. 31 unless otherwise noted.







Company Developments

Oil Well Supply Division, U.S. Steel Corp., will curtail operations later this year at two plants in western Pennsylvania. The move reflects a decision to consolidate pump fabrication operations at its Garland (Tex.) plant. The plants affected are the Wilson-Snyder Works, at Braddock, and the Imperial Works, at Oil City.

•

Douglas Oil Co., Los Angeles, has exercised its option to buy a 400-acre tract near Pittsburg, Calif. The price is reportedly around $1-million. The site is near major refineries of Standard Oil Co. of California, Union Oil Co. of California, Shell Oil Co., and Tidewater Oil Co. Continental Oil Co. is currently negotiating to buy Douglas.

•

Dayco Corp. is selling its tire division to Firestone Tire & Rubber Co. Dayco says the sale in no way affects its substantial holdings in Copolymer Rubber & Chemical Corp., Baton Rouge, La. Dayco's Dayton (Ohio) plant is devoted almost exclusively to tire production. The tire division represents some 30% of Dayco's total sales volume. One of Dayco's subsidiaries makes specialized hose for the oil and chemical industries.

•

International Harvester Co. is making steel safety fuel tanks for use on its heavy-duty trucks. Production is under way at the company's Fort Wayne (Ind.) truck plant on four models of single tanks for either gasoline or diesel fuel.

•

Gate City Steel Co., Omaha, will distribute wire rope and wire rope slings for the wire rope division of Jones & Laughlin Steel Corp. in Iowa, Nebraska, North Dakota, South Dakota, Montana, Colorado, and Kansas.

•

Expansions

Kerr-McGee Oil Industries, Inc., took another step last week to broaden its uranium business. Through its subsidiary, Kermac Nuclear Fuels Corp., the company acquired all the capital stock of Lakeview Mining Co. and Gunnison Mining Co. in a stock exchange deal. Both companies are engaged in the milling of uranium-bearing ores into uranium oxide under contracts with the Atomic Energy Commission.

Lakeview owns a small solvent extraction process uranium mill in Lakeview, Ore., and Gunnison owns a similar mill at Gunnison, Colo.

•

Cantex Corp. has been set up by Barnwell Offshore, Inc., to specialize in a lost-circulation material to be used in mud systems. The new wholly owned subsidiary will have R. J. Robbins as president and Charles H. Dresser, Jr., as executive vice-president. R. S. Barnwell, Jr., is chairman.

•

Radiochemicals will be manufactured by ChemTrac Corp., a new jointly owned subsidiary of Baird-Atomic Inc., and Controls for Radiation, Inc., two Cambridge (Mass.) firms. The company, under the technical direction of John C. Leak, will manufacture a complete line of radioactive tracer chemicals used in industrial and engineering research.

•

Monsanto Chemical Co. moved closer to self-sufficiency in petroleum-based chemical raw materials last week. The company announced plans to manufacture a variety of oxo-alcohols in a plant to be built at its new Chocolate Bayou (Tex.) chemical complex. Oxo-alcohols are the chief ingredients in the manufacture of phthalate, phosphate, and adipate plasticizers and functional fluids.

•

A computer application division has been set up by Internuclear Corp., Clayton, Mo., a subsidiary of Petrolite Corp. The division will serve the oil, chemical, feed, fertilizer, and other industries.

•

Overseas

M. W. Kellogg Co. will build petrochemical facilities at Barra a Barra, near Lisbon, Portugal, for Uniao Fabril do Azoto. Facilities include a 180-metric-ton-a-day ammonia plant, a 40,500-ton-a-year urea plant, and nitric acid, ammonium nitrate, and nitro-limestone plants.

Indiana Standard Is Putting the Pieces Together With a Unified Plan

Standard Oil Co. (Ind.) may soon be ready to embark on a wide-scale application of its "principle of selectivity"—the so-called superstation plan.

Under this plan, Standard has endeavored to retain market share and brand acceptance in certain test cities, while cutting down to a small number of carefully located service stations.

Earlier this year, Standard told PETROLEUM WEEK that the superstation experiment was a complete success (PW—Feb.10'61p42).

The most impressive phase of this experiment is being conducted at Vincennes, Ind., where one station is said to dispense as much gasoline as nine stations in the town had done in the past. Other tests, also successful, were carried out in Fairfield, Iowa, and Mattoon, Ill.

In about a month, Indiana Standard will introduce the superstation concept to its regional staff.

This does not mean, however, that all regions are immediately going to reduce drastically the number of their stations, and replace them with elaborate new ones.

Before this can be done, Standard must carry out a program of orientation.

First step in the superstation expansion plan is to acquaint the company's regional executives with the lessons learned in the test cities.

It is doubtful that the research team, which will explain the superstation philosophy to the regional staff, will preach full acceptance of the selective-location theory, at least to the extent that it was carried out in Vincennes.

The company hinted very strongly last week that it had perhaps gone too far at Vincennes, even though total gallonage is the same now as it was before closing eight stations.

As a result, future applications of the selectivity principle will probably follow closely the pattern set at Mattoon, where two stations have taken the place of five.

Indiana Standard may open another station in Vincennes.

The company did not rule out the possibility of its unveiling a superstation in a large city—to impress upon the regional staff the full potency of superstations.

Besides the selectivity principle, Indiana Standard will review other aspects of its market tests—including some that were less successful.

The regional staff will learn, for example, that the practice of conducting "weekend specials" is not especially rewarding.

At Vincennes, such "specials" have included the selling of Christmas tree lights at cost. This and other similar efforts proved to have only transitory value.

"Weekend specials pull customers," a Standard executive concedes. "but these customers won't come back until you have another weekend special."

Another disappointing merchandising experiment was the widespread dissemination of credit cards within test markets. This effort, too, lacked long-term value.

"Just giving a man a credit card won't make a customer out of him," a Standard official remarked last week.

This reaction should not, however, be taken as evidence that Standard is wholly dissatisfied with credit-card promotion schemes.

On the contrary, it is apparently quite pleased with its "Tell-a-Friend" program, in which 8,221 employees, acting as a mass solicitation committee, last year enlisted 48,000 new credit-card customers.

Standard is also enhancing the value of its credit card by extending its travel insurance plan to motorists outside the Midwest. This plan permits a motorist to subscribe to accident insurance through his monthly credit invoice.

Before Standard actually attempts to transplant its superstation concept into markets outside the Midwest, it intends to examine the factors that contribute to brand acceptance in communities where it has a comparatively small market share.

This is a logical step for the company to take—in view of the recently completed reorganization of its mar-

keting operations under American Oil Co.

This reorganization brought together three dissimilar marketing organizations—those of Utah Oil Refining Co. and American Oil Co. and Standard's own marketing operation.

Striking contrasts exist between the company's dominant strength in the Midwest and its sparse representation in parts of the East, for example.

The superstation approach may eventually serve as a means by which Standard can fill some of the gaps in its nationwide marketing area.

The company plans to analyze this possibility by going into markets where it controls only 2% to 3% of the total gallonage (compared to the 20% it enjoys in parts of the Midwest), and conducting market research tests.

For the first of these tests, "We'll probably go down East somewhere," a Standard executive told PETROLEUM WEEK.

If these tests are successful, the superstation may well dominate the company's expansion strategy throughout the next few years.

Thus, instead of attempting to increase market share with great spurts of expansion (through the acquisition of retiring jobbers, for example) Standard may rely heavily on its own newly built, well-placed outlets.

Such a strategy would call for careful analysis of market trends and shifting geographical patterns, so that the company will be able to pinpoint locations that will serve major traffic flows.

It is not surprising, therefore, that last year Indiana Standard conducted a far-reaching market study on which it will base its strategic network of outlets.

An essential phase of this study was centered on the federal interstate highway program. This investigation has already seemed to have an impact on the company's expansion tactics.

Standard erected scores of outlets along the interstate system in 45 states last year, or bought thousands of dollars of real estate at key highway locations for future stations.

How these stations will be operated raises an interesting question. This year, Standard inaugurated an entirely new system of station management (for itself, at least).

Under this system, a dealer is converted to salaried-manager status and is later permitted to work exclusively on commission. Currently this plan is under test at Vincennes, where the company's superstation may well provide the prototype in operating methods for the future.

On May 23, the marketing executives of the newly expanded American Oil Co. will introduce their first nationwide promotion campaign.

This campaign will serve to announce publicly the marketing reorganization, which has gone largely unnoticed by the motoring public.

Some of the themes that have sparked Standard's Midwest promotions will be extended to the other regions. One of these will be the company's "More Miles Per Gallon" campaign, in which a new carburetor additive, M_2PG, is promoted. M_2PG means twice as much mileage per gallon.

American Oil has already set out to unify its gasoline brand names.

Last year, it announced that American Superpremium and American Regular will identify its fuels in the West and in the former Standard Oil market of the Midwest (PW—Jul.22'60,p44).

In the East, American Oil is calling its top grade American Regular.

This regional shift in terminology calls attention to a fundamental obstacle that stands in the way of complete brand unification.

Not only are many of the American Oil stations in the East substandard by comparison with the Midwest, but they rely entirely on a different brand image.

This image is built around nonleaded premium gasoline.

Whether or not American Oil will sacrifice this drawing card in the interests of unity seems doubtful. But one thing is clear. The company has taken steps to bring the octane quality of gasoline in the East and the West closer into line with the products it inherited from its parent in the Midwest.

In this way, American's new torch and emblem symbol will represent a more nearly uniform quality of gasoline than was possible in the past.

Of course, the unifying process called for changes in the Midwest, too. The company is discarding the crowns that adorn its pumps there, and is also modifying its station design.

The results have been a cleaner-line design, with lube bay doors shifted to the rear, and a new pump that dispenses both premium and regular gasoline from the same hose.

What's New / IN MARKETING

The Washington state legislature has added another 1¢ to its gasoline tax—pushing it to 7½¢.

Together with the 4¢ federal tax, Washington motorists face a total levy of 11½¢ a gal.

This is the highest state-federal gasoline tax in continental U.S.

An organization called Overtaxed, Inc., has already announced that it plans to file a referendum against the increase—providing it obtains enough signatures.

•

Octane ratings of gasoline on sale at service stations held again in March at an average 99.3-octane for premium and 92.6-octane for regular.

Premium has remained unchanged since last August, and regular has changed only once (a two-month drop to 92.5-octane last fall).

Ethyl Corp.'s monthly survey shows that octane ratings have shown very little change over the past year. Compared to March, 1960, premium has declined slightly from 99.5-octane, while regular has moved up from 92.4-octane.

•

Lion Oil Co. has appointed Marshall Oil Co., Marshall, Tex., as a jobber for its products in Harrison County.

This is the second announcement by Lion of a new jobber in East Texas this year. The first was in Paris.

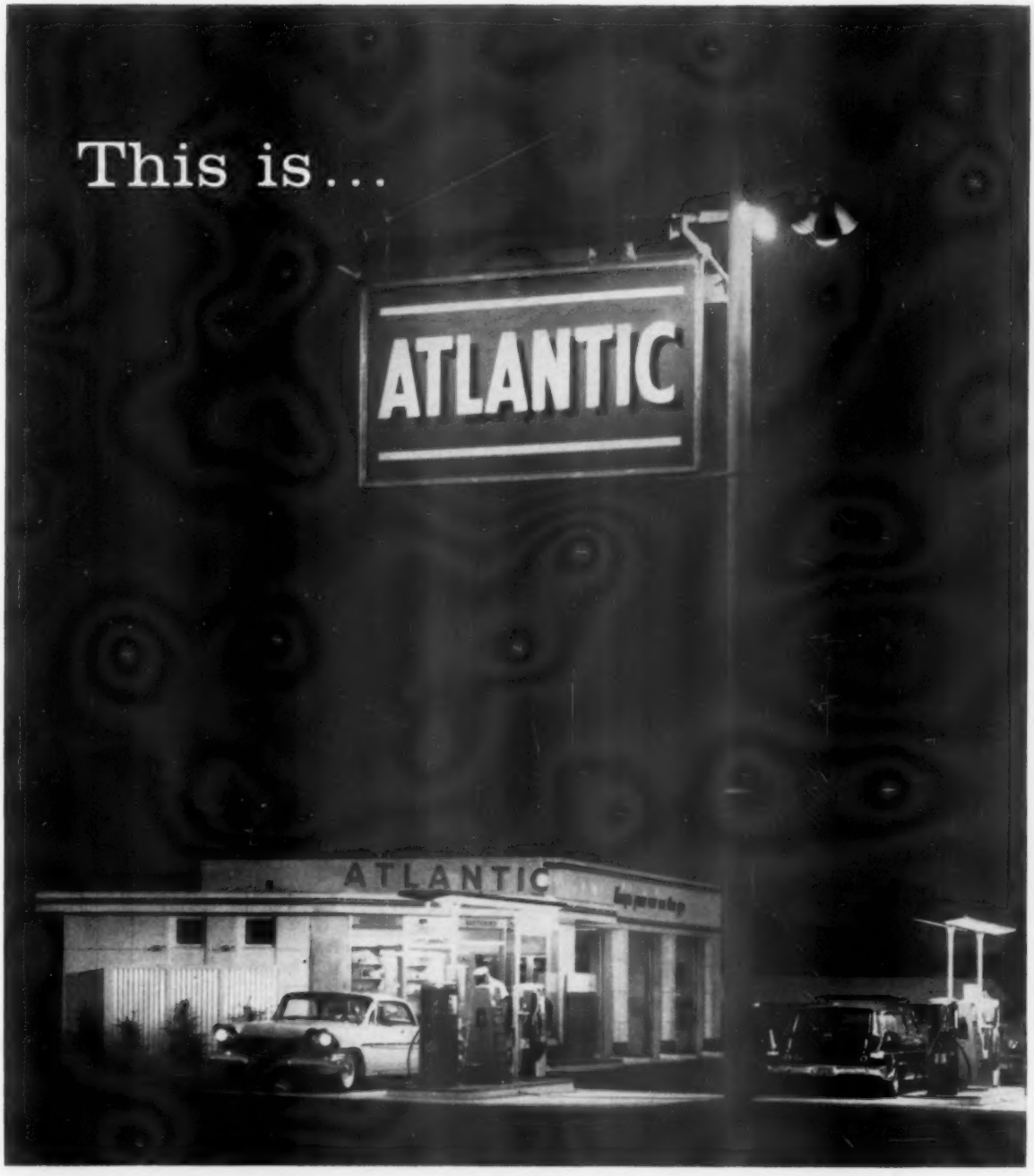
Marshall serves about ten stations, and expects to add more in the near future.

•

Montana motorists may be buying substandard petroleum products, E. C. Wren, the state's agriculture commissioner, has charged.

Wren is about to establish quality standards for all petroleum products sold in the state, an assignment given to him by the 1961 legislature.

Wren is setting up a testing laboratory, and says he will make periodic inspections of all stations in Montana.



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R. Hortenstine, Jr.

R. C. Rieder

RALEIGH HORTENSTINE, JR., has been promoted to vice-president and assistant to the president of Continental-Emsco Co., with offices at its Dallas headquarters, and **R. C. RIEDER** has joined the company as vice-president in charge of manufacturing and engineering, in Dallas. Hortenstine has been vice-president in charge of Gulf Coast operations for C-E, at Houston, since 1954. He joined C-E in 1934. Rieder was formerly vice-president, a director, and works manager for Baker Perkins, Inc., Saginaw, Mich., manufacturer of chemical mixers and processing machinery.

D. KENNETH FINLAYSON has joined Scientific Design Co., New York, as vice-president, sales. He will be in charge of the company's sales department, and will aid in enlarging the scope of its activities. Finlayson was most recently eastern representative of the business development group serving all divisions of Bechtel Corp., and was vice-president of Bechtel International Corp. He has also been associated with Stone & Webster Engineering Corp., E. B. Badger & Son, Girdler Corp., Kellex Corp., and M. W. Kellogg Co.

ROBERT CLAY, sales representative for pipeline coatings of the protective coatings division of Pittsburgh Chemical Co. in western Pennsylvania, Ohio, West Virginia, and Kentucky, will serve an additional area, including the states of Indiana and Michigan. He will continue to have headquarters in Columbus, Ohio.

E. THEODORE BECK moves up to sales manager for Votator continuous processing equipment for the Girdler Process Equipment Division of Chemetron Corp., in Louisville, Ky. Beck has been sales manager for the division's overseas operations since 1958, and before that was eastern district sales manager for Votator equipment.

J. L. PEARCE has been appointed sales engineer for Otis Pressure Control, Inc., Calgary, the Canadian division of Otis Engineering Corp., Dallas. He was formerly located at Victoria, Tex., as a gas lift engineer for Otis. He will continue in this capacity, in addition to his other sales responsibilities, in his new Canadian assignment.

J. R. Ghublikian

R. G. Hargrove

JOHN R. GHUBLIKIAN has been named manager of the process engineering section, and **ROBERT G. HARGROVE** manager of the project engineering section, of Badger Mfg. Co., Cambridge, Mass. Ghublikian will be in charge of the activities of the process development department, headed by **G. A. Randall,** and the process design department, under **W. F. Wilkinson.** In his new position, Hargrove will supervise the activities of the project, mechanical, and drafting departments. Ghublikian joined Badger in 1953 as a senior process engineer for the design of plants for the manufacture, purification, and recovery of petroleum products and organic and inorganic chemicals. Hargrove was assistant manager of the engineering division at Mobil Oil Co.'s Paulsboro (N. J.) refinery before joining Badger.

HUGH J. McNELIS is a new sales engineer in the Philadelphia office of De Laval Separator Co.'s industrial division. Before joining De Laval, McNelis was associated with Simplex Valve & Meter Co. De Laval serves the processing industries with plate heat exchangers and centrifugal separators.

AMERICAN SYSTEMS, INC., Hawthorne, Calif., an affiliate of Schlumberger Well Surveying Corp., has established seven operating divisions, some of which previously existed as laboratories. The new groups and their directors are: **Louis M. Ballard,** instrument division; **Bernard Diener,** component development division; **William Wagenseil,** instruction division; **Dr. Robert E. Fagen,** information sciences division; **M. Donald Adcock,** electromagnetic systems division; **John W. Bozeman,** command and control division; and **Arthur W. Vance,** research laboratories division.

GUSTAVE F. WUNDER has been named general manager of Procon (Great Britain), Ltd., London, a subsidiary of Procon, Inc., Des Plaines, Ill. Wunder joined Procon in 1952 as a coordinating engineer, and became chief engineer in Britain in 1960.

ROBERT E. JOHNSTON, JR., has been elected vice-president, sales, of Fox Steel Pipe Corp., which recently established a sales organization for nation-wide marketing of electric

resistance weld API line pipe, with headquarters in Birmingham, Ala. Johnston has been assistant sales manager of a pipe manufacturer in Louisiana for the past several years. Fox Steel Pipe is a subsidiary of Joseph H. Fox & Co.; it has sales offices in Birmingham, Baton Rouge, La., and Jacksonville and Pompano Beach, Fla.

JAMES E. GRADY moves up to division manager at Tulsa for Welex, a division of Halliburton Co., and **George Harcourt** succeeds him as Welex's area sales manager in Dallas. Harcourt was formerly a sales engineer for Welex in Houston.

LEROY BIDWELL, JR., has joined Southwest Industries, Inc., Houston, as manager and senior sales engineer for its New Orleans branch office. He will coordinate sales and service of the company's line of precision engineered equipment for the petroleum and chemical industries in the Louisiana Gulf Coast area. Bidwell was most recently a sales engineer in Louisiana for Otis Engineering Corp., and before that was associated with Diversa, Inc., and Sohio Petroleum Co.

L. Bidwell, Jr.

A. H. Stephens

ARNOLD H. STEPHENS has rejoined Grove Valve & Regulator Co. as Southern California district manager for sales of valves and regulators, with headquarters at the company's Los Angeles sales office. He has been consultant in the application of pneumatic controls, and supervisor of the propulsion and launching laboratories for Hughes Aircraft Co., since leaving Grove a few years ago.

JIM MILSTED has been appointed sales engineer for the oil tools department of Avondale Shipyards, Inc., at its Harvey Quick Repair Yard, in New Orleans. His new position will also take him to Houma, Leesville, Morgan City, and Venice, La. Milsted has been a sales and service engineer for Cameron Iron Works, Inc.

CLYDE LACKEY will be export sales manager of Cabot Corp.'s new export sales division, in its machinery division, with headquarters at Houston. He was formerly sales manager for Cabot at Pampa, Tex. For the last several months, Lackey has been establishing new dealerships for Cabot products in South America, Mexico, and Europe.

BURSON-MARSTELLER ASSOCIATES, an affiliate of Marsteller, Rickard, Gebhardt & Reed, Inc., has been appointed product publicity counsel for Enjay Chemical Co., New York, a division of Humble Oil & Refining Co.

JOHN LUBKE has been appointed production superintendent at Odessa for the Pipe Inspectors Division of Plastic Applicators, Inc. Lubke joined Pipe Inspectors in 1960 when Plastic Applicators purchased Trip Check, Inc., in which he was a partner. He has also been associated with Tuboscope Co., and Sperry Western Co.

J. Lubke

H. F. Dunaway

H. F. DUNAWAY is the new store manager at Big Spring, Tex., for the National Supply Division of Armco Steel Corp., succeeding **Oran D. Nash**, who becomes store manager at Abilene, Tex. Dunaway was formerly field salesman for National Supply at Snyder, Tex. **Herbert N. Seigler**, formerly store manager at Abilene, has been transferred to Wichita Falls, Tex.

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(Classified Advertising)
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Common Stock

($1 Par Value)

All of these shares having been sold, this advertisement appears as a matter of record only.

LEHMAN BROTHERS

March 30, 1961.

Place the Blame Where It Belongs

THE USUAL SPRING WITCH HUNT IS ON. Observers of the deteriorating statistical position of the petroleum industry are searching for the villain that brought on the present sad state of economic affairs.

The frequent comment heard now is: If the Texas Railroad Commission hadn't granted a ten-day producing schedule in March and a nine-day schedule in April, the supply-demand situation would have been in better balance. That's like saying that the teacher is at fault when Johnny comes home with a poor report card.

If anyone is to be burned at the stake to pay for the industry's sins, it's the industry itself. Or, at least, the industry managers who insisted on grinding up every barrel of crude they could lay their hands on.

Not all of the purchasers of Texas crude wanted ten days for March and nine for April. But at the mid-February statewide hearing, four of the largest buyers presented a strong case for a ten-day producing pattern. One of them said it would need an 11-day schedule.

At that time, William J. Murray, Jr., chairman of the Railroad Commission, commented that the ten-day pattern for March "is dangerously high and will have to be carefully watched in the future." A month later, five large companies led the move for a nine-day schedule for April. Again, one of them said it could use the production from a ten-day pattern.

BACK AT THE REFINERIES, crude has been going through the stills at a record pace. Runs in February, averaging 8,413,000 b/d, were the highest for any month in the industry's history. And January runs were the second-highest. By mid-March, the refiners were finally convinced that inventories were beginning to back up, so they announced cutbacks—and, in fact, made cutbacks—in runs.

The reductions in throughput came about a month too late, however, to prevent breaks in product prices. The hardest blow—and one the industry will have a tough time overcoming—was the reduction in gasoline prices in the Gulf Coast spot market.

THE CUTBACKS in refinery operations brought total runs by the end of March down to what many in the industry consider a reasonable level. Some are optimistic enough to predict that if runs can be held below 7.9-million b/d at least until late summer, then the industry may be able to solve its own problems.

But the odds on that prediction are mighty long.

what makes an acid treatment profitable?

In Oklahoma, a Dowell-engineered acid treatment gave the desired production increase, yet cost $1350 less than treatments used on other wells in the same field.

In Utah, Dowell-engineered acidizing boosted well production from 34 to 450 bopd in a field where other acid treatments had broken through to water.

In South Texas, a Dowell-engineered acid treatment opened up a salt water disposal well where earlier treatments had failed.

What single difference made these treatments more successful than earlier efforts?

The one difference that towered above all others is engineering. Dowell designed each treatment to fit well conditions and the operator's needs. The result was extra profit.

Dowell is well-qualified in the kind of engineered treatment design that results in excellent profit increases.

Dowell developed the Acid Guide* — a new method for designing treatments and predicting probable results. Several thousand successful acid jobs have been designed with the help of the Acid Guide within the past two years.

Dowell has an unsurpassed fund of data on formation and fluid characteristics from many fields. This information is necessary for scientific treatment planning but it is often not available from individual operators.

Dowell has a large variety of acid additives as well as collateral products and services to improve results from acid treatments.

To summarize, Dowell has the experience, the information, the acid additives, the collateral products and services, the technically-trained personnel and the laboratory facilities to design engineered acid treatments. Results have been high success ratios and satisfactory payouts on investments.

There *is* a difference in acidizing services. Dowell services and products are offered from more than 150 offices and stations in the United States, Canada, Venezuela, Argentina, Germany, France and the Sahara area. Dowell, Tulsa 1, Oklahoma.

*DOWELL SERVICE MARK

SERVICES FOR THE OIL INDUSTRY

DOWELL

DIVISION OF THE DOW CHEMICAL COMPANY

ANNOUNCING A NEW REFINERY FOR AUSTRALIA

Engineering, Procurement, Construction Assigned by Stanvac to Kellogg

*Standard-Vacuum Oil Company release, February 21, 1961**

WHITE PLAINS, N.Y.—The contract for Standard-Vacuum Oil Company's second refinery in Australia—a 37,800 barrels-a-day fuel products and solvents plant to be built near Adelaide, South Australia—has been awarded to The M.W. Kellogg Company. The award was announced yesterday in Adelaide by Sir Thomas Playford, Premier of South Australia, on behalf of Stanvac's affiliate, Standard-Vacuum Refining Company (Australia) Pty. Ltd.

The refinery will be constructed on a 594-acre site at Port Noarlunga, 14 miles south of the South Australian capital city. Ground will be broken in mid-year, and start-up is scheduled for January 1963.

The new plant will raise Stanvac's crude processing capacity in Australia to approximately 80,000 barrels a day.

Plans call for the use of Persian Gulf crude oil for the production of gasoline, diesel fuels, illuminating kerosene, liquefied petroleum gas, sulfur, asphalt, and solvents—all for the Australian market.

Kellogg's contract covers engineering, requisitioning, and procurement, as well as construction of all process and mechanical equipment, tankage, buildings, and utilities. Major process units will be a crude splitter, vacuum pipestill, hydro-desulfurizer, catalytic reformer and sulfur recovery plant. Tankage will be installed for nearly 2.5 million barrels of crude oil and products.

Maximum use during the construction period will be made of Australian labor, sub-contractors, and suppliers.

Stanvac's entry into petroleum refining in Australia was in 1948, when it built a small lubricating oil plant. This was expanded in 1953 for the production of fuel products. It currently has a throughput capacity of 42,000 barrels a day.

THE M. W. KELLOGG COMPANY

711 Third Avenue, New York 17, N.Y. • A Subsidiary of Pullman Incorporated

Offices of other Kellogg companies are in Toronto, London, Paris, Rio de Janeiro, Caracas, Buenos Aires

*Even before this date, The M. W. Kellogg Company in New York, and its subsidiary constructing the plant in Australia, were at work on the project.